DOCUMENT RESUME

ED 079 154 SE 016 542

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TITLE	A Supplementary Program for Environmental Education, Industrial Arts, Grade 9-12.
INSTITUTION	Project I-C-E, Green Bay, Wis.
SPONS AGENCY	Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE	72
NOTE	99p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Behavioral Objectives; *Environmental Education; Fundamental Concepts; *Industrial Arts; Instructional Materials; Interdisciplinary Approach; Learning Activities; *Lesson Plans; *Secondary Grades; *Teaching Guides
IDENTIFIERS	ESEA Title III

ABSTRACT

Presented in this teacher's guide for grades 7-12 are lessons plans and ideas for integrating industrial arts (power mechanics, graphic arts, plastics, and electricity/electronics) and environmental education. Each lesson originates with a fundamental concept pertaining to the environment and states, in addition, its discipline area, subject area, and problem orientation. Following this, behavioral objectives and suggested learning experiences are outlined. Behavioral objectives include cognitive and affective objectives and skills to be learned, while learning experiences list student-centered in-class activities and outside resource and community activities. Space is provided for teachers to note resource and reference materials--publications, audio-visual aids, and community resources. The guides are supplementary in nature and the lessons or episodes are designed to be placed in existing course content at appropriate times. This work was prepared under an ESEA Title III contract for Project I-C-E (Instruction-Curriculum-Environment). (BL)

ED 079154

Project I - C - E INSTRUCTION - CURRICULUM - ENVIRO

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Industrial Arts GRADE 9-12

1. Power Mechanics
2. Graphic Arts
3. Plastics
4. Electricity - Electronics

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
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INSTRUCTION - CURRICULUM - ENVIRONMENT

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ENVIRONMENTAL EDUCATION

Arts GRADE 9-12

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Arts

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city - Electronics

S.E.A.

-8-9

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464)

Robert Warpinski, Director
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PREFACE

"Oikus" for house is the Greek origin of the term "ec
studies our house--whatever or wherever it may be. Lik
expand or contract to fit many ranges--natural and man-
environments, our many "houses" if we omit rancor and c
complexities. Our "oikus" uses the insights of all sub
multidisciplinary program like ours necessarily results
a long time, our program ranges K thru 12. The environ
values. These values have their origin in the "oikus"
minds. Let us become masters of our house by replacing
with "Know thyself and thine house."

1. Written and designed by your fellow teachers, this g
   to fit appropriately into existing, logical course c
2. Each page or episode offers <u>suggestions</u>. Knowing yo
   to <u>adapt</u> or <u>adopt</u>. Limitless chances are here for y
   Many episodes are self contained, some open-minded,
   developed over a few days.
3. <u>Try these episodes</u>, but <u>please pre-plan</u>. Why? Simp
   and no curriculum will work unless viewed in the con
4. <u>React</u> to this guide with scratch ideas and notes on
5. After using an episode, <u>fill out the attached evalua</u>
   duplicate, or request more of these forms. Send the
   We sincerely want your reactions or suggestions--neg
   <u>evaluations are the key</u> in telling us "what works" a
   the guides.

TERMS AND ABBREVIATIONS

ICE RMC is <u>Project ICE Resource Materials Center</u> serv
school districts in CESA 3, 8, and 9. Check the Projec
resources. Our address and phone number is on this gui
or call us for any materials or help.

BAVI is Bureau of Audio Visual Instruction, 1327 Univ
Madison, Wisconsin 53701 (Phone: 608-262-1644).

Cognitive means a measurable mental skill, ability, o
Affective refers to student attitudes, values, and fe

PREFACE

Greek origin of the term "ecology". Environmental education
or wherever it may be. Like an umbrella, our house can
any ranges--natural and man-made. We can add quality to our
ses" if we omit rancor and cite long range gains, costs, and
uses the insights of all subjects. Thus, a rational, positive,
ike ours necessarily results. Also, since attitudes grow over
ages K thru 12. The environment mirrors our attitudes or
their origin in the "oikus" of our collective and individual
rs of our house by replacing the Greek adage of "Know thyself"
e house."

your fellow teachers, this guide is supplementary in nature--
o existing, logical course content.
ers suggestions. Knowing your students best, you decide what
tless chances are here for your experimentation and usage.
ontained, some open-minded, still others can be changed or
s.
please pre-plan. Why? Simply, no guide has all the answers,
ork unless viewed in the context of your students.
scratch ideas and notes on the episode pages.
fill out the attached evaluation form in the back. Use,
re of these forms. Send them singly or collectively to us.
eactions or suggestions--negative and positive. Your
in telling us "what works" and in aiding our revisions of

source Materials Center serving all public and non-public
8, and 9. Check the Project ICE Bibliography of available
phone number is on this guide's cover. Feel free to write
s or help.
isual Instruction, 1327 University Avenue, P. O. Box 2093,
hone: 608-262-1644).
ble mental skill, ability, or process based on factual data.
nt attitudes, values, and feelings.

ACKNOWLEDGEMENTS: The following teachers and consultants part
of the Supplementary Environmental Educatio

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D. C. Aderhold, Bonduel
John Anderson, Peshtigo
Walter Anderson, Wausaukee
Bonnie Beamer, Coleman
Merlyn Blonde, Shawano
R. A. Dirks, Gillett
Dennis Dobrzenski, White Lake
LeRoy Gerl, Oconto
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Sister Claudette, St. Charles
Ervin Kunesh, Marinette
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Terry Otto, St. John (L)
Arthur Paulson, Oconto Falls
Marie Prochaska, Lena
Christine Proctor, Wausaukee
Arthur Schelk, Suring
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achers and consultants participated in the development
ıtary Environmental Education Guides:

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ert Becker, Fox Valley (L)
Chriss, Hortonville
ff Christensen, Winneconne
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ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

1. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

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Proble

BEHAVIORAL OBJECTIVES	SU
Cognitive: The student will be able to write a short paragraph briefly explaining the relationship of sun energy to fuel sources. Affective: The student will gain an appreciation for the role of the sun in raw fuel production. Skills to be Learned 1. How fuels are formed. 2. How fuels are refined. 3. How fuels are used.	II. Student-Center activity A. Thru class develop a combustible 1. Oil a. Gasol b. Fuel c. Keros d. Tar. 2.Coal a. Gas b. Coke 3. Natural 4. Wood a. Turpe b. Wood B. How was/is responsible "fuels"? C. How is sun released fr 1. Burn som in a pan release. D. Films "Refi "Story of G

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Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Fuel Sources & The Sun

Grade 9-12

ES	SUGGESTED LEARNING EXPERIENCES	
	II. Student-Centered in class activity A. Thru class discussion develop a list of combustible fuel sources. 1. Oil a. Gasoline b. Fuel oil c. Kerosene d. Tar. 2. Coal a. Gas b. Coke 3. Natural gas 4. Wood a. Turpentine b. Wood alcohol B. How was/is sun energy responsible for these "fuels"? C. How is sun energy released from fuel? 1. Burn some fuel oil in a pan to demonstrate release. D. Films "Refinery at Work" "Story of Gasoline"	II. Outside Resource and Community Activities 1. Field trip to refinery. 2. Representative from petroleum industry.

Resource and Reference Materials	Continued and Additional Sugg
Publications: Auto Mechanics Fundamentals, Martin W. Stockel Goodheart-Willcox Audio-Visual: Refinery at Work, Shell film library Story of Gasoline U. S. Bureau of Mines #52385 Conserving Our Natural Resources, Univ. of Ill. #00864 Treasures of The Earth, University of Ill, Champaign, Community: 1. Representative from petroleum industry. 2. Fuel Oil Dealer. 3. Combustion engineer.	1. Develop collection of "fu 2. Develop bulletin board of refined) 3. Develop bulletin board of

ıls	Continued and Additional Suggested Learning Experiences 1. Develop collection of "fuels" both raw & refined. 2. Develop bulletin board of fuel cycle (sun-raw-refined) 3. Develop bulletin board of a refinery process.
um	

CONCEPT	2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.	Discipline Subject Problem Ori

ESEA Title III -59-70-0135-2 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGES
Cognitive: The student will name and compare in writing the four basic systems of an internal combustion engine to the systems of existence. Affective: The student will realize the interaction between the four basic systems of an internal combustion engine and the effects produced if one or more systems fail to function properly. Skills to be Learned 1. Principles of internal combustion. 2. Systems analysis 3. Basic systems of internal combustion a. Fuel b. Electrical c. Cooling d. Exhaust 4. Systems necessary to human existence.	I. Student-Centered in activity A. Film on internal ion. B. Transparency seri discussion of bas internal combusti 1. Fuel 2. Electrical 3. Cooling 4. Exhaust C. Discuss function importance of gau performance indica D. Develop flow chart what results if or these systems or g fails to function E. Compare basic syst their functions to living in todays w (Compares to) egs. 1. Engine--Living general. 2. Fuel---Gas, oil electricity. 3. Cooling--Air, wa 4. Exhause--Waste

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Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Internal Combust- Grade 10-12
ion vs. External Existence

	SUGGESTED LEARNING EXPERIENCES	
	I. Student-Centered in class activity A. Film on internal combustion. B. Transparency series & discussion of basic internal combustion systems 1. Fuel 2. Electrical 3. Cooling 4. Exhaust C. Discuss function & importance of gauges or performance indicators. D. Develop flow chart on what results if one of these systems or gauges fails to function properly. E. Compare basic systems & their functions to people living in todays world. (Compares to) egs. 1. Engine--Living in general. 2. Fuel---Gas, oil, food, electricity. 3. Cooling--Air, water. 4. Exhause--Waste disposal	II. Outside Resource and Community Activities A. Sociologist B. Have students find examples in community and determine basic integral systems and their functions. (Con't)

Resource and Reference Materials	Continued and Additional Sugge
Publications:	(Con't from I.) 5. Gauges--Communications (Con't from II.) 1. Have students find other interaction in the commu them identify the basic define their functions.
Audio-Visual: Film- ABC's of Internal Combustion, Gen. Motors	
Community: 1. Sociologist	

s	Continued and Additional Suggested Learning Experiences
	(Con't from I.) 5. Gauges--Communications (Con't from II.) 1. Have students find other examples of interaction in the community and have them identify the basic systems and define their functions.
ion,	

ESEA Title III -59-70-0135-2 Project I-C-4

CONCEPT		
	3. Environmental factors are limiting on the numbers of organisms living within their influence, thus, each environment has a carrying capacity.	Discipline Subject Problem Or

BEHAVIORAL OBJECTIVES	SUGGES
Cognitive: Students will orally, or in writing, list and illustrate at least three physical and three psychological effects of crowding. Affective: The student will realize that crowding results in adverse physical and psychological effects. Skills to be Learned Hazards in environmental crowding.	I. Student-Centered ir activity A. Conduct experime the following co 1. Develop simpl students, in will dis/asse a single cyli 2. Provide only of tools req' 3. Limit work ar one table. 4. Limit time. 5. First team fi B. Discuss personal feelings experie experiment, 1. Low productio 2. Confusion 3. Frustration 4. Irritability 5. Waste 6. Injury C. What is the resu this happened in D. Relate experienc concept #3.

actors are limiting

organisms living

ence, thus, each

carrying

Discipline Area Indusrial Arts

Subject Power Mechanics

Problem Orientation Crowding in the shop. Grade 9-12

	SUGGESTED LEARNING EXPERIENCES	
ll nd fects ding sical cts.	I. Student-Centered in class activity A. Conduct experiment around the following conditions: 1. Develop simple task ie, students, in pairs, will disassemble a a single cylinder engine. 2. Provide only one each of tools req'd. 3. Limit work area to one table. 4. Limit time. 5. First team finished wins. B. Discuss personal and physical feelings experienced during experiment, 1. Low production 2. Confusion 3. Frustration 4. Irritability 5. Waste 6. Injury C. What is the result if this happened in town. D. Relate experienced results to concept #3.	II. Outside Resource and Community Activities A. Psychologist. B. Community planning committee. C. Real estate developer.
al		

Resource and Reference Materials	Continued and Additional Sugg
Publications:	
Audio-Visual: #53525 Man's Effect on the Environment, U. of Ill, Champaign	
Community: A. Psychologist or socialogist B. Community planning committee C. Real estate developer	

nued and Additional Suggested Learning Experiences

CONCEPT

4. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area Indu

Subject Powe

Problem Orientation W E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNIN
Cognitive: The student will be able to list 4 advantages & 2 disadvantages of atomic energy as a means of producing electricity. Affective: The student will become aware of the possible detrimental effects of producing electricity by atomic means, as well as the advantages. Skills to be Learned Generation of atomic power.	I. Student-Centered in class activity A. Show films Atomic Power Production, How a Boiling Water Reactor Operates B. Field trip to a nuclear power plant C. Presentation by rep. from local power company. D. Read text units on Atomic Power Production. E. Debate in class the advantages & disadvantages of Atomic Power Production. F. The students will write a report on the effects on water used in the production of atomic power

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d on oxygen, through

release the energy

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Water Use & Atomic Energy. Grade 9-12

CTIVES	SUGGESTED LEARNING EXPERIENCES	
nt 4 vant- y as nt ntal c e	I. Student-Centered in class activity A. Show films Atomic Power Production, How a Boiling Water Reactor Operates B. Field trip to a nuclear power plant C. Presentation by rep. from local power company. D. Read text units on Atomic Power Production. E. Debate in class the advantages & disadvantages of Atomic Power Production. F. The students will write a report on the effects on water used in the production of atomic power	II. Outside Resource and Community Activities 1. Field trip to a nuclear power plant 2. Local power company rep. 3. D.N.R. rep. 4. A.E.C. rep.

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: Power Technology, Geo. Stepherson, Delman Publishing	1. Develop bulletin board on atomic energy 2. Develop a newspaper clipping file relat energy production (community envolvemen 3. Have students measure & chart water tem at various distances from an atomic pow determine possible thermal pollution of
Audio-Visual: #6373 Atomic Power Production, Bay 1 #1706 How a Boiling Water Reactor Operates, BAVI	
Community: 1. Local power company rep. 2. D.N.R. rep. 3. A.E.C. rep.	

ials	Continued and Additional Suggested Learning Experiences
	1. Develop bulletin board on atomic energy production. 2. Develop a newspaper clipping file related to atomic energy production (community envolvement) 3. Have students measure & chart water temperature at various distances from an atomic power plant to determine possible thermal pollution of the water.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 5. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area In

Subject Pow

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARN
Cognitive: 1. The students list & describe 3 emmission control devices. 2. The students describe 4 advantages & disadvantages of low/no lead gasoline. 3. The students list the procedure for engine tune up. Affective: The student will have an appreciation for proper engine tune-ups. Skills to be Learned 1. Engine tune-up procedures. 2. Use of test equip. 3. How emmission control devices affect the air quality.	I. Student-Centered in class activity A. Visit car dealership service dept. Talk on emission control devices & their maintenance. B. Round table discussion "Why do we need emission control devices" (in summation relate discussio to concept #5) C. Develop a display of emission control devices. D. Develop a service chart for EC devices. E. Debate the pros/cons of using low/no lead gasoline. F. Movies for wrap-up 1. Air Pollution & Cars 2. The Answer is Clear

adequate supply of clean air

ential because most organisms

d on oxygen, through respir-

, to release the energy in food.

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Air Pollution Grade 9-12

TIONAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
1. The students cribe 3 emmission vices. dents describe tages & dis- ges of low/no soline. dents list the re for engine The student an appreciation engine tune-	I. Student-Centered in class activity A. Visit car dealership service dept. Talk on emission control devices & their maintenance. B. Round table discussion "Why do we need emission control devices" (in summation relate discussion to concept #5) C. Develop a display of emission control devices. D. Develop a service chart for EC devices. E. Debate the pros/cons of using low/no lead gasoline. F. Movies for wrap-up 1. Air Pollution & Cars 2. The Answer is Clear	II. Outside Resource and Community Activities 1. Service dept local dealership. 2. Oil Co. distributor. 3. D.N.R. rep. 4. GM.-Ford-Am. Cry.- rep.
be Learned tune-up procedures test equip. ission control affect the lity.		

Resource and Reference Materials

Publications:
Automotive Imission Control,
Wm. H. Crouse, Gregg/McGraw-Hill
The Quest for Cleaner Air,
Motor Service, Aug. 71
Principles & Promises of the
Wankel, Road & Track Feb. 71
Those New Gasolines, Popular Mech.
Feb. 71

Audio-Visual:
To Clean the Air, United World
Free Film Service, 221 Park Ave.
N.Y. N.Y. 10003
Toward Cleaner Air, Assoc.
Sterling Film, 866 3rd Ave.
New York, N.Y. 10022
Air Pollution & Cars
The Answer is Clear
GM Corp. Public relations staff
Film libarary GM bldg.
Detroit, Mich. 48202
No Time To Waste
Modern Talking Picture Service
2523 New Hyde Park Rd.
Long Island, N.Y. 11040

Community:
1. Local service dept.
2. Oil Co. dist.
3. D.N.R. rep.
4. Big 3 rep.

Continued and Additional Suggested Lea

1. Write a paper on the development
   control devices.
2. Develop a graph showing % of air
3. Develop a graph of various types
   comparing (1) efficiency (2) % po
   (3) economy.

erials	Continued and Additional Suggested Learning Experiences
l, w-Hill he 71 ar Mech.	1. Write a paper on the development of emission control devices. 2. Develop a graph showing % of air pollution by cars. 3. Develop a graph of various types of engines comparing (1) efficiency (2) % pollution (3) economy.
orld k Ave.	
staff	
vice	

CONCEPT

6. Natural resources are not equally distributed over the earth or over time and greatly affect the geographic conditions and quality of life.

Discipline Area Ind

Subject Pow

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: The student will write a research paper on oil pipe lines & their impact on the environment Affective: The student will understand problems involved in transporting crude oil. Skills to be Learned 1. How crude oil is located. 2. Problems involved in transporting crude oil to refinery. 3. Community involvement.	I. Student-Centered in class activity A. Lecture by oil co.rep. dealing with how oil deposits are located B. Round table discussion: Now that the oil is discovered & the well brought in how do you get it to the refinery? 1. Truck 2. Boat 3. Pipe line 4. Railroad 5. Combination C. What factors are considered in selecting a transportation system? 1. Cost 2. Environmental impact 3. Natural terrain 4. Distance 5. Profit margin D. How do the above considerations affect the quality of life at: 1. Well site 2. Transportation route 3. Refinery site (Con't)

ral resources are not equally

uted over the earth or

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nic conditions and quality

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Transporation of Crude Oil Grade 9-12

RAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
The student research pipe lines ct on the ne student nd problems transporting	I. Student-Centered in class activity A. Lecture by oil co.rep. dealing with how oil deposits are located B. Round table discussion: Now that the oil is discovered & the well brought in how do you get it to the refinery? 1. Truck 2. Boat 3. Pipe line 4. Railroad 5. Combination C. What factors are considered in selecting a transportation system? 1. Cost 2. Environmental impact 3. Natural terrain 4. Distance 5. Profit margin D. How do the above considerations affect the quality of life at: 1. Well site 2. Transportation route 3. Refinery site (Con't)	II. Outside Resource and Community Activities A. Oil co. rep. B. D.N.R. C. Dept. of Interior
Learned oil is lo- nvolved rting crude finery. involvement.		

Resource and Reference Materials	Continued and Additional Suggested
Publications: Free literature from oil companies Audio-Visual: #52385 Conserving Our Natural Resources, University of Ill. Community: 1. Oil company rep. 2. D.N.R. 3. Dept. of Interior	(Con't from I.) E. Debate pros & cons of the Trans- using facts discovered by indivi (Have one group research pros o 1. Develop map showing the followi 1. Well locations 2. Refinery locations 3. Well to refinery routes (colo mode of transportation) 4. Severe environment impairment & description of cause of imp

Continued and Additional Suggested Learning Experiences

(Con't from I.)

E. Debate pros & cons of the Trans-Alaska Pipe Line using facts discovered by individual research. (Have one group research pros other group cons)

1. Develop map showing the following:
   1. Well locations
   2. Refinery locations
   3. Well to refinery routes (color code for mode of transportation)
   4. Severe environment impairment sites & description of cause of impairment.

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

Discipline Area Industri

Subject Power

Problem Orientation Effe Recreat

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING E	II.
Cognitive: The student will list 5 ways in which leisure vehicles, while contributing to our economy, are changing or damaging the environment, and changing our way of life. Affective: The student will be aware of effects recreational vehicles are having on his surroundings, and realize its long term effects. Skills to be Learned 1. Research. 2. Harmful results of leisure vehicle operation. 3. Statistic usage.	I. Student-Centered in class activity A. Develop (through discussion) a list of factors which have contributed to the development & popularity of recreational vehicles. 1. Snowmobiles 2. Boats 3. All terrain vehicles B. Brainstorm list of detremental effects to water, land, & air quality as a result of these vehicles. 1. Pollution of water. 2. Pollution of Air. 3. Compacting of land. C. Have students project (via small group conference & discussion) long-range effects of use of recreational vehicles. D. Discuss movement of people to "recreational areas" for usage of leisure time.	

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s in land use and centers
tion density.

L OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e student ys in which es, while o our hanging e environ- ging our student of effects ehicles his sur- realize its cts.	I. Student-Centered in class activity A. Develop (through discussion) a list of factors which have contributed to the development & popularity of recreational vehicles. 1. Snowmobiles 2. Boats 3. All terrain vehicles B. Brainstorm list of detremental effects to water, land, & air quality as a result of these vehicles. 1. Pollution of water. 2. Pollution of Air. 3. Compacting of land. C. Have students project (via small group conference & discussion) long-range effects of use of recreational vehicles. D. Discuss movement of people to "recreational areas" for usage of leisure time.	II. Outside Resource and Community Activities A. Conduct traffic surveys during different times of the year, counting number of vehicle's towing recreational vehicles, and comparing to total number of vehicles. B. Observe areas receiving heavy snowmobile traffic before & after the snowmobiling season. Compare growth of grass on trail & adjacent to it. C. Chamber of Commerce representative to point out major geographic recreation areas.
earned ults of icle operation. sage.		

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: Audio-Visual: Maps, Charts, or Graphs developed by students from traffic survey. Community: Chamber of Commerce rep.	1. Create map showing geographical locat of major recreational areas and their type of recreational activity. 2. Draw charts or graphs to illustrate r of traffic survey (Community Activity 3. Keep perpetual survey of geographic r area use of students in class. This only be of benefit in meeting objecti can also be used as a local recreatio

ference Materials	Continued and Additional Suggested Learning Experiences
r Graphs udents from traffic erce rep.	1. Create map showing geographical locations of major recreational areas and their main type of recreational activity. 2. Draw charts or graphs to illustrate results of traffic survey (Community Activity A) 3. Keep perpetual survey of geographic recreational area use of students in class. This will not only be of benefit in meeting objectives, but can also be used as a local recreational guide.

CONCEPT

8. Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

Discipline Area Industria

Subject Power Mec

Problem Orientation Pollu Devic

ESEA Title III -59-70-0135-2 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX
Cognitive: The student will be able to list anti-pollution devices required on internal combustion engines. The student will be able to list the cultural, social, political, and economic factors which these devices have caused. Affective: The student will understand the factors which lead to the requirement of anti-pollution devices and the results of their use. Skills to be Learned The operation of anti-pollution devices on internal combustion engines. Cost analysis Data gathering Data analysis	I. Student-Centered in class activity A. Students will study anti-pollution devices for internal combustion engines. B. Students will develop a list of social and political factors which lead to the required use of these devices. C. Students will figure economic factors which have resulted from the required use of these devices. D. Student will list cultural factors produced by the required use of these devices.

, social,

determine

and attitudes

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Discipline Area Industrial Arts

Subject Powerr Mechanics

Problem Orientation IPollution ControlGrade 9-12
IDevices.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Students will study anti-pollution devices for internal combustion engines.
   B. Students will develop a list of social and politicall factors which lead to the required use of these devicees.
   C. Students will figure economic factors which have resulted from the required use of these devices.
   D. Student will list cultural factors produced by the required use of these devices.

III. Outside Resource and Community Activities
Rep. from auto manufacturer.

Resource and Reference Materials	Continued and Additional Suggested Lea
Publications: National newspapers. Auto Mechanics Fundamentals, Martin W. Stockel Goodheat-Willcox Power Technology George E. Stephenson Delmar Publishing Audio-Visual: Charts from auto manufacturers. Community: Rep. from auto manufacturer.	

Continued and Additional Suggested Learning Experiences

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 9. Man has the ability to manage, manipulate, and change his environment.

Discipline Area Industrial

Subject Power Mecha

Problem Orientation Engine

BEHAVICRAL OBJECTIVES	SUGGESTED LEARNING EXPE	
Cognitive: The student will be able to tune-up an engine to reduce exhaust emission and increase engine efficiency. Affective: The student will realize the difference proper adjustment makes in exhaust emission, both the pollution and economic standpoint. Skills to be Learned A. Carburetor adjustment. B. Checking and adjusting ignition system. 1. Plugs. 2. Points.	I. Student-Centered in class activity A. Discuss increased uses of small engines in recent years. 1. Develop a list of ways in which small engines are changing our enviroment. 2. Using an exhaust analyzer, test emission from a badly tuned engine. 3. Tune-up same engine and retest for exhaust emission.	II. Ou Co A.

to manage,

his

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Engine Tune-Up Grade 9-12

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Discuss increased uses of small engines in recent years.
      1. Develop a list of ways in which small engines are changing our enviroment.
      2. Using an exhaust analyzer, test emission from a badly tuned engine.
      3. Tune-up same engine and retest for exhaust emission.

II. Outside Resource and Community Activities
   A. Rep. from a small engine manufacturer.

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: Power Technology, George E. Stephenson Delmar Publishers Small Gas Engines, Jud Purvis Goodheart-Willcox Audio-Visual: T51011 Spark In Time On The Firing Line, University of Ill., Champaign, Ill. Community: Rep. from small engine manu.	

ntinued and Additional Suggested Learning Experiences

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT

10. Short-term economic gains may produce long-term environmental losses.

Discipline Area Industrial

Subject Power Mecha

Problem Orientation Disposal Oil

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	II. Ou Co
Cognitive: The student will list 3 improper oil disposal methods & write a brief description of possible long term environmental losses related to disposal. Affective: The student will realize that improper disposal of waste oil may cause long-term environmental losses. Skills to be Learned 1. Environmental losses as it relates to waste oil disposal. 2. The proper handling of waste oil. 3. Oil changing procedure.	I. Student-Centered in class activity A. Students will survey local garages to find out how they dispose of waste oil & why they use the method they do. Assign garages so owners are not assaulted by the whole class. B. Individually report on disposal method discovered 1. Dump in sewer a. Storm b. Sanitary 2. Burn 3. Dump on land a. At garage pit b. Local dump 4. Store for reclaim 5. Personal reuse C. Round table discussion "How Do These Disposal Methods Produce Long-Term Environmental Uses"	1. 2. 3.

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Disposal of Waste Oil Grade 9-12

SUGGESTED LEARNING EXPERIENCES

udent-Centered in class
tivity

Students will survey local garages to find out how they dispose of waste oil & why they use the method they do. Assign garages so owners are not assaulted by the whole class.

Individually report on disposal method discovered

1. Dump in sewer
   a. Storm
   b. Sanitary
2. Burn
3. Dump on land
   a. At garage pit
   b. Local dump
4. Store for reclaim
5. Personal reuse

Round table discussion "How Do These Disposal Methods Produce Long-Term Environmental Uses"

II. Outside Resource and Community Activities

1. Local garages.
2. Local oil company
3. See "I.-A."

Resource and Reference Materials	Continued and Additional Suggested I
Publications: 1. Oil company literature.	1. Have students develop alternative disposal methods that will not ha detriments and/or uses for waste 2. Develop slide series on waste oil
Audio-Visual: 1. Teacher/student developed slide series.	
Community: 1. Local garages. 2. Oil company rep.	

Materials	Continued and Additional Suggested Learning Experiences
ure.	1. Have students develop alternative waste oil disposal methods that will not have environmental detriments and/or uses for waste oil. 2. Develop slide series on waste oil disposal methods.
eloped	

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area Industrial A

Subject Power Mechani

Problem Orientation Tire Selec

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI	
Cognitive: The student will be able to list 3 good and 3 harmful effects of studded tires. Affective: The student will remove studded tires from his car whenever their use is not vital. Skills to be Learned The wearing effect studded tires have on highway surfaces. The environmental problems and economic loss involved in highway resurfacing.	I. Student-Centered in class activity A. Study wheels, hubs, tires 1. Wheel parts 2. Hub lubrication 3. Tire plys 4. Tire size 5. Tire balance 6. Tire inflation 7. Tire composition B. Slide presentation on studded tire. 1. How made 2. Uses 3. Effects on road surface. 4. Regulations on use. 5. Comparison to snow tires. C. Highway engineer to make presentation on highway resurfacing due to studded tires.	II. Outs Comm High Tire

icated or

ficant

over

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Tire Selection Grade 9-12

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Study wheels, hubs, tires
1. Wheel parts
2. Hub lubrication
3. Tire plys
4. Tire size
5. Tire balance
6. Tire inflation
7. Tire composition

B. Slide presentation on studded tire.
1. How made
2. Uses
3. Effects on road surface.
4. Regulations on use.
5. Comparison to snow tires.

C. Highway engineer to make presentation on highway resurfacing due to studded tires.

II. Outside Resource and Community Activities

Highway engineer.
Tire dealer.

Resource and Reference Materials	Continued and Additional Suggested Lea
Publications: Auto Mechanics Fundamentals, Martin W. Stockel Goodheart-Willcox Audio-Visual: Auto Mechanics: Wheels and Tires #53620 U. of Ill, Champaign, Ill. Community: Local tire dealer State Highway engineer	

ued and Additional Suggested Learning Experiences

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 12. Private ownership must be regarded as a stewardship and should not enroach upon or violate the individual right of others

Discipline Area In

Subject Po

Problem Orientatio

BEHAVIORAL OBJECTIVES	SUGGESTED LEAR
Cognitive: The student will be able to list the ways man has wasted power supplies in the areas of wood, coal, oil and gas. Affective: The student will help through work with community action groups to reclaim wasted power supplies and conserve the remaining supplies. Skills to be Learned Conservation and reclamation of power supplies. Cooperation.	I. Student-Centered in class activity A. The students will study, Man's Struggle To Harnes Energy 1. Early attempts to con 2. Current power develop B. The students will develo a list of ways man can reclaim some of the wast power supplies, and a list of ways man must conserve his remaining power supplies.

rship must be

vardship and

n upon or

idual right of others

Discipline Area Industrial Arts

Subject Power Mechanics

Problem Orientation Waste of Power Supplies. Grade 9-12

TIVES	SUGGESTED LEARNING EXPERIENCES	
t ed oil t : ining	I. Student-Centered in class activity A. The students will study, Man's Struggle To Harness Energy 1. Early attempts to control. 2. Current power developments. B. The students will develop a list of ways man can reclaim some of the wasted power supplies, and a list of ways man must conserve his remaining power supplies.	II. Outside Resource and Community Activities A. D.N.R.
mation		

Resource and Reference Materials	Continued and Additional Suggest
Publications: Power Technology, George E. Stephenson Delmar Publishers, Inc. Encyclopedias History Bocks Audio-Visual: Fuels: Their Nature and Use U. of Ill. Champaign, Ill. Community: D.N.R.	

e Materials	Continued and Additional Suggested Learning Experiences
c.	
d Use Ill.	

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

1. Energy from the sun, the basic source of all energy, is converted thrcugh plant photosynthesis into a form all living things can use for life processes.

Discipline Area I

Subject G

Problem Orientati

BEHAVIORAL OBJECTIVES	SUGGESTED LEA
Cognitive: The student will be able to identify in writing how a laser basically operates & how it is used for the composition of printed matter. Affective: The student will appreciate the value of the sun's energy for type composition. Skills to be Learned 1. Type composition 2. Physics of light & energy as it is related to the printing industry.	I. Student-Centered in class activity A. The student will write a brief paper on the discovery & history of lasers. B. The student will indent by listing the characte istics of lasers that relate to & from the su & how it is utilized in the graphic arts indust C. Small groups of student will report on: 1. Industries that use lasers & how they are applied. 2. Different energy's from the sun that are used for the li process. 3. Man's future uses o the laser beams.

from the sun, the basic

l energy, is converted

t photosynthesis

all living things
life processes.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Laser Beam & Type Composition

Grade 10-12

BJECTIVES	SUGGESTED LEARNING EXPERIENCES	
tudent dentify laser s & r the inted tudent he s mposition.	I. Student-Centered in class activity A. The student will write a brief paper on the discovery & history of lasers. B. The student will indentify by listing the characteristics of lasers that relate to & from the sun & how it is utilized in the graphic arts industry. C. Small groups of students will report on: 1. Industries that use lasers & how they are applied. 2. Different energy's from the sun that are used for the life process. 3. Man's future uses of the laser beams.	II. Outside Resource and Community Activities A. Physics teacher to explain lasers and their uses. B. Physicist or nuclear engineer to explain the history & how lasers are used for the Federal government. C. Local printer who has knowledge of lasers to discuss the use of them in the printing industry. D. Visit to a plant that uses lasers for scientific purposes, manufacturing, etc.
ned on nt is printing		

Resource and Reference Materials	Continued and Additional Suggested L
Publications: Graphic Arts Tech. Found, Inc. 4615 Forbes Ave. Pittsburgh, Pa 15213 Tech Abstracts	
Audio-Visual: Lasers: An Introduction #533313 U. Ill. Champaign, Ill.	
Community: Local printer having knowledge of laser use.	

ials	Continued and Additional Suggested Learning Experiences
c.	
ge	

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.

Discipline Area Ind

Subject Gra

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARN
Cognitive: The student will clean-up when the clean-up period arrives, and not only complete his own responsibility, but also check overall results. Affective: The student will understand that all living systems interact among themselves & their environment, realizing clean-up is a combined effort, not an effort by an individual.	I. Student-Centered in class activity A. Ignore clean-up for one day. B. Have students work next day in messy area with un-cleaned presses & othe equipment. C. Evaluate on 3rd day the need for clean-up and relate it to the shop production and environmen D. Organize schedule of duti & responsibilities stress ing teamwork. E. Discuss & compare results of clean-up vs. no clean-up, and discuss group interaction and cooperati as it relates to clean-up and everyday existence. F. From this discussion, dev lop a task list for each individual & a chain of command for each individu to answer to.
Skills to be Learned 1. Cooperation 2. Responsibility 3. Benefits of clean-up 1. Neater work results. 2. Equipment in proper place-easier to find & use. 3. Better operating & producing presses. 4. Safer working atmosphere.	

ing organisms interact

elves and their

, forming an intricate

an ecosystem.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Clean-up Grade 7-12

L OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e student when the d arrives, omplete sibility, overall student d that tems in- hemselves nment, n-up is ort, not n individ-	I. Student-Centered in class activity A. Ignore clean-up for one day. B. Have students work next day in messy area with un-cleaned presses & other equipment. C. Evaluate on 3rd day the need for clean-up and relate it to the shop production and environment. D. Organize schedule of duties & responsibilities stressing teamwork. E. Discuss & compare results of clean-up vs. no clean-up, and discuss group interaction and cooperation as it relates to clean-up and everyday existence. F. From this discussion. develop a task list for each individual & a chain of command for each individual to answer to.	II. Outside Resource and Community Activities A. Field trip to local printing industry and view practical applications & advantages of neatness & cleanliness B. Industrial safety commission rep.
earned ity clean-up ork results. t in proper sier to se. perating & g presses. rking atmosphere.		

Resource and Reference Materials	Continued and Additional Suggested
Publications: Graphic Arts, Frederick D. Kagy Goodheart-Willcox	1. Have students develop "round ro of making clean-up more efficie each student an opportunity to up responsibility. 2. Develop a list on where else a effort would be beneficial.
Audio-Visual:	
Community: Industrial Safety Commission representative. Representative of local printing industry.	

Materials	Continued and Additional Suggested Learning Experiences
	1. Have students develop "round robin" system of making clean-up more efficient and give each student an opportunity to have each clean-up responsibility. 2. Develop a list on where else a team clean-up effort would be beneficial.

ission

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ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT: 3. Environmental factors are limiting on the numbers of organisms living within their influence, thus, each environment has a carrying capacity.

Discipline Area: Industr

Subject: Graphic

Problem Orientation: Crow Shop

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING E
Cognitive: The student will list & explain 3 physical & 3 psychological effects of environmental crowding & relate them to specific shop areas Affective: The student will realize that crowding results in adverse physical & psychological conditions result. Skills tc be Learned Hazards in environmental crowding.	I. Student-Centered in class activity A. Conduct experiment around following conditions: 1. Develop simple task ie, set business card from Calif. job case. 2. Provide only one each of tools req'd. 3. Limit work area to one job case. 4. Limit time (slight) 5. Mass production not allowed. 6. First three done win. B. Discuss personal & physical feelings experienced during experiment. 1. Low production 2. Confusion 3. Frustration 4. Irritability 5. Waste 6. Injury (Cont'd)

II.

ironmental factors are

ng on the numbers of

sms living within their

nce, thus, each environment
carrying capacity.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Crowding in the Shop

Grade 7-12

ORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
The student explain 3 psycholog- of environ- ing & relate ific shop he student that crowd- in adverse sychological esult. Learned nvironmental	I. Student-Centered in class activity A. Conduct experiment around following conditions: 1. Develop simple task ie, set business card from Calif. job case. 2. Provide only one each of tools req'd. 3. Limit work area to one job case. 4. Limit time (slight) 5. Mass production not allowed. 6. First three done win. B. Discuss personal & physical feelings experienced during experiment. 1. Low production 2. Confusion 3. Frustration 4. Irritability 5. Waste 6. Injury (Cont'd)	II. Outside Resource and Community Activities A. Sociologist B. Community planning committee rep. C. Real estate developer

Resource and Reference Materials	Continued and Additonal Suggested Learnin
Publications: Graphic Arts, Frederick D. Kagy Goodheart-Willcox Audio-Visual: #53525 Man's Effect on the Environment, Univ. of Ill. Community: 1. Sociologist 2. Community planning committee rep. 3. Real estate developer	(Con't from I.) C. Discuss what would result if a town we & managed as in the experiment. D. Relate experiment results to concept #

ls	Continued and Additonal Suggested Learning Experiences
	(Con't from I.) C. Discuss what would result if a town were planned & managed as in the experiment. D. Relate experiment results to concept #3.

CONCEPT 4. An adequate supply of pure water is essential for life.

Discipline Area

Subject

Problem Orienta
Trea

BEHAVIORAL OBJECTIVES	SUGGESTED L
Cognitive: The student will be able to name the paper companies having waste water treatment facilities within a 50 mile radius of the school. Affective: The student will learn to appreciate the clean water on recreation, fishing, etc. Skills to be Learned 1. Paper composition. 2. How paper is made. 3. Treatment of water after it is used in a paper mill. 4. Paper selection for specific jobs.	I. Student-Centered in class activity A. Lecture & discussion paper mill rep. "Water treatment facilities paper companies". 1. Machines used in treatment. 2. Chemicals used in treatment. 3. Results achieved. 4. Short & long term plans for water treatment facilitie B. Write a short paper or water treatment on pap mills using lecture notes & related resear C. Question & answer sess with E,P.A. rep. to determine what & who polluting water & what they are doing.

y of pure

r life.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Paper Manufacture Grade 7-12
Treatment of Waste Water

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Lecture & discussion by paper mill rep. "Water treatment facilities in paper companies".
      1. Machines used in treatment.
      2. Chemicals used in treatment.
      3. Results achieved.
      4. Short & long term plans for water treatment facilities.
   B. Write a short paper on water treatment on paper mills using lecture notes & related research.
   C. Question & answer session with E,P.A. rep. to determine what & who is polluting water & what they are doing.

II. Outside Resource and Community Activities
   A. Field trip to a paper mill.
   B. Public relations dept. of paper mill.

Resource and Reference Materials	Continued and Additional
Publications: Pulp & Paper, 500 Howard St. San Francisco, Calif. 94105 American Paper Industry, 2570 Devon Ave. Des Planes, Ill 60018 Chemical Paper Processing, Hale Publishing Co. One Bank St. Stanford, Conn. 06901 Audio-Visual: Recyling Paper, Riverside Paper Co. Appleton, Wis. Great White Trackaway, Hammermill Paper Co. Erie, Penn. Community: Public relations dept. local mill.	1. Develop bulletin boar making effluent treat 2. Collect water samples 3. On a local map use co companies and other i return it to the rive denote waste treatmen

ls	Continued and Additional Suggested Learning Experiences
	1. Develop bulletin board flow chart showing paper making effluent treatment flow chart. 2. Collect water samples from various stages. 3. On a local map use colored pins to identify paper companies and other industries which use water & return it to the river, lake, etc. (Have pins denote waste treatment quality)

CONCEPT

5. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area Indust

Subject Graphi

Problem Orientation Ha

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
Cognitive: The student will be able to list the effects of solvent vapor on the respiratory system. Affective: The student will use safety precautions to prevent the breathing of harmful solvent vapors. Skills to be Learned 1. Composition of cleaning solvents. 2. Effects of solvent vapor on the respiratory system. 3. Safe disposal of used solvents. 4. Poster construction.	I. Student-Centered in class activity 1. Student will write a short paper titled: "Is Air Pollution Caused By Cleaning Solvents Used in the Printing Industry?" 2. As a group, the students will develop a plan for effective disposal of used cleaning solvents. 3. Students will construct a safety poster describing the effects of solvents on the repiratory system.

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ase the energy

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Harmful Vapors Grade 7-12

VES	SUGGESTED LEARNING EXPERIENCES	
	I. Student-Centered in class activity 1. Student will write a short paper titled: "Is Air Pollution Caused By Cleaning Solvents Used in the Printing Industry?" 2. As a group, the students will develop a plan for effective disposal of used cleaning solvents. 3. Students will construct a safety poster describing the effects of solvents on the repiratory system.	II. Outside Resource and Community Activities 1. School chemistry teacher to give demonstration on effects of solvent vapor on materials related to human tissue. 2. Local doctor to discuss effect of solvent vapor on respiratory system.

Resource and Reference Materials Continued and Additional Suggested

Publications:
Graphic Arts,
Frederick D. Kagy
Goodheart-Willcox

Audio-Visual:

Community:
Local doctor.
Chemistry teacher.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 6.Natural resources are not equally distributed over the earth or over time and greatly affect the geographic conditions and quality of life.

Discipline Area Industri

Subject Graphic

Problem Orientation Water

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX	II.
Cognitive: Given a list of environmental conditions, land, man, employment, recreation that are affected by water shortage, the student will suggest solutions to printing operations that use water & how it can be saved. Affective: The student will learn to appreciate the limited supply of water. Skills to be Learned 1. Developing film a. Inspection b. Time & temp. 2. Platemaking with aluminum pre-sensitized plates. 3. Press operations	I. Student-Centered in class activity A. Student will write a philosophical (dream) on paper on what might happen to his environment if there was no water. B. Student will write a letter to the Bureau of the Interior to find out what locales have water shortages & what is being done to correct this ie., Ventura, Calif.--building reservoirs. C. Student will make a list of different chemicals that are added to water during printing operations & the amount of difficulty encounted in removing same.	

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Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Water Shortage Grade 9-12

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Student will write a philosophical (dream) on paper on what might happen to his environment if there was no water.
   B. Student will write a letter to the Bureau of the Interior to find out what locales have water shortages & what is being done to correct this ie., Ventura, Calif.--building reservoirs.
   C. Student will make a list of different chemicals that are added to water during printing operations & the amount of difficulty encounted in removing same.

II. Outside Resource and Community Activities
   A. Biologist with knowledge of water shortage effects on the total environment.
   B. Water treatment plant tour.
   C. Marine biologist to discuss the effects of chemicals on water & their impact on the ecosystem.
   D. Writing assignment could be an interaction between English and graphic arts.

Resource and Reference Materials	Continued and Additional Suggested Le
Publications: U. S. Bureau of Interior Water Related Publications Dept. Of Natural Resources Audio-Visual: #32027 Water-Old Problems, New Approaches, Univ. of Ill. Community: 1. Local marine biologist 2. Sewage engineer	1. Have students experiment with way process can eliminate or minimize pollution.

terials	Continued and Additional Suggested Learning Experiences
s s Ill.	1. Have students experiment with ways printing process can eliminate or minimize water use and/or pollution.

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 7. Factors such as facilitating transportation, economic conditions, population growth, and increasing leisure time have a great influence on changes in land use and centers of population density.

Discipline Area Indu

Subject Grap

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: The student will write an analysis paper on current, local recycling efforts. Affective: The student will save paper and packages for recycling instead of sending them to the dump. Skills to be Learned 1. Methods of recycling packages. 2. Methods of designing packages for easier recycling.	I. Student-Centered in class activity A. Local official to speak on local recycling efforts. B. Students will write a brief paper on recyling in your city and make a comparison of these efforts to those of other cities. C. The student will list the effects of non-recycleable material on land use. D. Students will design recycleable packages for: 1. Bottles 2. Meat products 3. Other food products, ect.

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, economic conditions,

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ave a great influence
land use and centers
density.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Packaging for Recycling Grade 7-12

BJECTIVES	SUGGESTED LEARNING EXPERIENCES	
tudent lysis local . tudent nd cling j	I. Student-Centered in class activity A. Local official to speak on local recycling efforts. B. Students will write a brief paper on recyling in your city and make a comparison of these efforts to those of other cities. C. The student will list the effects of non-recycleable material on land use. D. Students will design recycleable packages for: 1. Bottles 2. Meat products 3. Other food products, ect.	II. Outside Resource and Community Activities Designer from packaging company.
ned cling igning sier		

Resource and Reference Materials	Continued and Additiona
Publications:	
Audio-Visual:	
Community: Package designer. Local officals.	

ce Materials	Continued and Additional Suggested Learning Experiences

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT

8. Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

Discipline Area Industrial Art

Subject Graphic Arts

Problem Orientation Plate-Maki

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI	
Cognitive: The student will list the various metals used in offset printing plates. The student will list the various natural resources used in metal plates and processing materials & their availability. Affective: The student will appreciate his socio-economic status as related to natural resources, and how some of the resources on his list maintain and improve his standard of living.	I. Student-Centered in class activity 1. Lecture--demonstration-discussion on plates and platemaking. a. Types of plates b. Plate composition c. Plate making and processing. 2. Discuss and show (from demonstration) types of pollutants from plates. a. Organic oils b. Acidic waters c. Toxic materials 3. Discuss plate disposal and recycling methods 4. Relate the flow of events bearing out the fact that resources are needed to promote the flow of communications (via plate produced media) which very directly dictate man's values & attitudes toward his environment.	II. Outsi Comm 1. H l t a n c 2. H s o i a
Skills to be Learned 1. Plate make-up. 2. Plate processing. 3. Material derivations-where they come from. 4. Handling of pollutants. 5. Cause-effect thinking.		

l, economic, social,

l factors determine

n's values and

ward his environment.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Plate-Making Grade 11-12

IVES	SUGGESTED LEARNING EXPERIENCES	
tudent ious fset The the vari- rces tes and als & y. udent is atus ural w rces ain tandard	I. Student-Centered in class activity 1. Lecture--demonstration-discussion on plates and platemaking. a. Types of plates b. Plate composition c. Plate making and processing. 2. Discuss and show (from demonstration) types of pollutants from plates. a. Organic oils b. Acidic waters c. Toxic materials 3. Discuss plate disposal and recycling methods 4. Relate the flow of events bearing out the fact that resources are needed to promote the flow of communications (via plate produced media) which very directly dictate mans values & attitudes toward his environment.	II. Outside Resource and Community Activities 1. Have speaker from local printing firm talk about what they are doing about plate-making wastes, resource control, etc. 2. Have 3-M representative speak on availability of plate-making materials and other related areas.
ned ng. ations- from. llutants. hinking.		

Resource and Reference Materials	Continued and Additional Suggested Learning E
Publications: U.S. Bureau of Mines Progress Report, Aug. 1970	1. Have students find other examples of prog and resources affecting societys' way of and study how resource conservation and w materials are handled.
Audio-Visual: Transparencies on plate-making	
Local Printing firm rep. 3-M rep.	

e Materials	Continued and Additional Suggested Learning EXperiences
Progress te- ep.	1. Have students find other examples of progress and resources affecting societys' way of life, and study how resource conservation and waste materials are handled.

CONCEPT: 9. Man has the ability to manage, manipulate, and change his environment.

Discipline Area: Industr

Subject: Graphic

Problem Orientation: Nois

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING E
Cognitive: The student will identify the machines and/or areas that cause excessive noise & will select appropriate safety equipment. Affective: The student will appreciate & understand how noise affects the physiological system. Skills to be Learned 1. Offset press operation 2. Design for noise control 3. Noise protection	I. Student-Centered in class activity A. Lecture-discussion by the teacher or industrial commission rep. on effective noise control & its effect on working conditions. Factors to consider 1. Frequency 2. Overall level 3. Time distribution of noise exposure 4. Duration of exposure 5. Total work life exposure 6. Susceptibility to noise 7. Noise classification A. Auditory B. Non-auditory B. Research activity--report on noise provisions of the occupational safety & health act. C. How are local plants handling noise pollution?

as the ability to manage,

te, and change his

ent.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Noise Pollution Grade 7-12

RAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
The student fy the machines s that cause oise & will opriate oment. The student iate & under- oise affects ogical system.	I. Student-Centered in class activity A. Lecture-discussion by the teacher or industrial commission rep. on effective noise control & its effect on working conditions. Factors to consider 1. Frequency 2. Overall level 3. Time distribution of noise exposure 4. Duration of exposure 5. Total work life exposure 6. Susceptibility to noise 7. Noise classification A. Auditory B. Non-auditory B. Research activity--report on noise provisions of the occupational safety & health act. C. How are local plants handling noise pollution?	II. Outside Resource and Community Activities A. Representative from a large printing co. who works in the press room to discuss noise control in his area. B. Psychiatrist--noise control & its effect on the psychological system. C. Students volunteer to interview local plant representatives to find and/or tape-record the answers to in-class activity. Students will set up appointments and have questions approved by the teachers before any interview.
e Learned ress operation or noise control otection		

Resource and Reference Materials	Continued and Additional Suggested Learni
Publications: Graphic Arts Tech. Found., 4615 Forbes Ave. Pittsburgh, Pa. 14213 Environmental Controls State: Occupational Safety & Health Act Audio -Visual: #80067 Noise & Health, Univ. of Ill. #53497 Noise is Pollution, Too, Univ. of Ill. Community: 1. Local safety engineer 2. Industrial Commission rep.	1. Have students design & install noise devices on school machines.

ence Materials	Continued and Additional Suggested Learning Experiences
Found.,	1. Have students design & install noise suppression devices on school machines.
213 rols l Safety	
lth, Univ. of	
liution, Too,	
gineer mission rep.	

CONCEPT 10. Short-term economic gains may produce long-term environmental losses.

Discipline Area Industrial

Subject Graphic Ar

Problem Orientation Depleti Resourc

ESEA Title III - 59-70-0135-2 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	II. Ou Co
Cognitive: The student will list the natural resources used in paper making. The student will list the ways paper manufacturing is depleting our natural resources. Affective: The student will learn to appreciate the aesthetic value of natural resources used in paper manufacturing. Skills to be Learned 1. Paper composition 2. How to replenish natural resources used in paper manufacturing.	I. Student-Centered in class activity A. View film on papermaking. B. List paper companies in your area and the natural resources they use. C. List what each company is doing to replenish the resources they use.	1. 2. 3. 4. 5. 6.

conomic gains

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sses.

Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Depleting Natural Resources. Grade 7-12

IVES	SUGGESTED LEARNING EXPERIENCES	
nt dent nt	I. Student-Centered in class activity A. View film on papermaking. B. List paper companies in your area and the natural resources they use. C. List what each company is doing to replenish the resources they use.	II. Outside Resource and Community Activities 1. Visit local papermill. 2. Visit tree farm. 3. Visit paper mill waste water treatment plant. 4. Forester from a paper company. 5. Public relations dept. of a local paper mill. 6. D.N.R. rep.

Resource and Reference Materials	Continued and Additional Suggested
Publications: Printing Views for the Midwest Printer & Lithographer, Feb. 1972 Pulp & Paper 500 Howard St. San Francisco, Calif. 94105 American Paper Industry, 2570 Devon Ave. Des Plaines, Ill. 60018 Audio-Visual: Film: Blue Sky Thinking, Hammermill Paper Co. Erie, Pa. Community: Public relations dept. of a local paper mill. Forester from local paper mill.	

laterials	Continued and Additional Suggested Learning Experiences
Midwest 04105 of er	

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area Industr

Subject Graphic

Problem Orientation Dis
Rotog

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
Cognitive: The student will be able to list the ways of cylinder disposal & their environment. Affective: The student will be made aware of the tremendous use of resources in cyl. products & the eventual disposition of materials, and the ultimate results. Skills to be Learned 1. Plastic etchings 2. Printing from an engraved surface	I. Student-Centered in class - II activity A. Intaglio printing 1. Principles of rotogravure printing. a. Examples of work & plates b. Uses for this process c. Plastic etchings 1. Production 2. Use B. Have students research the types of metals used in Rotogravure cylinder making and the mining impact of their origin. (More cylinders-more impact) C. Have students research the disposition of dead cylinders (more cylinders-more waste?) D. Possible alternatives (brain storm) Can they be used for colleges, sculptures, abstract design, mobiles, odd furniture, bric a brac.

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Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Disposal of Rotogravure Plates

Grade 10-12

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
- A. Intaglio printing
  - 1. Principles of rotogravure printing.
    - a. Examples of work & plates
    - b. Uses for this process
    - c. Plastic etchings
      - 1. Production
      - 2. Use
- B. Have students research the types of metals used in Rotogravure cylinder making and the mining impact of their origin. (More cylinders-more impact)
- C. Have students research the disposition of dead cylinders (more cylinders-more waste?)
- D. Possible alternatives (brain storm) Can they be used for colleges, sculptures, abstract design, mobiles, odd furniture, bric a brac.

II. Outside Resource and Community Activities
- A. Tour a local gravure printing plant.
- B. Tour an engraving plant.
- C. Rotogravure specialist
  - 1. Metals used
  - 2. Cylinder usage & disposal
- D. Engraver
  - 1. Types of engraving

Resource and Reference Materials	Continued and Additional Suggested
Publications: Graphic Arts Monthly	1. Develop a collection of roto 2. Develop a cost analysis of a
Audio-Visual: Teacher made slide series and/or trans. visualizing intaglio & rotogravure process.	
Community: Local engravure Local rotogravure specialist.	

Continued and Additional Suggested Learning Experiences

1. Develop a collection of roto plates & examples.
2. Develop a cost analysis of a roto plate.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 12. Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.

Discipline Area Industrial

Subject Graphic Ar

Problem Orientation Owners Industry vs. Rig

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	
Cognitive: The student will list 10 instances where taking all liberties because a person is an owner of a publication may have negative effects. Affective: The student will realize that ownership of a printing establishment does not overule rights and feelings of others. Skills to be Learned 1. Concepts behind "free speech" cliche. 2. "Unwritten" rights of others.	I. Student-Centered in class activity A. Openly-lead discussion-- 1. Question: What is the difference between reporting and editorializing? a. What are the good and bad points of the two types of writing? B. Relate-through discussion: Just because a person is the owner of a publication, he doesn't have the right to write anything he wishes, just as a person or persons doesn't have the right to do anything he wishes with his property, materials, wastes, etc. C. Role-play situation of editor or publication owner vs.,Other journalist Community citizen Judge, Lawyer	II. Ou Co Lo en te

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Discipline Area Industrial Arts

Subject Graphic Arts

Problem Orientation Ownership of Industry vs. Rights of Ownership Grade 7-12

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Openly-lead discussion--

1. Question: What is the difference between reporting and editorializing?

a. What are the good and bad points of the two types of writing?

B. Relate-through discussion: Just because a person is the owner of a publication, he doesn't have the right to write anything he wishes, just as a person or persons doesn't have the right to do anything he wishes with his property, materials, wastes, etc.

C. Role-play situation of editor or publication owner vs.,Other journalist
Community citizen
Judge, Lawyer

II. Outside Resource and Community Activities
Local journalist or english (journalism) teacher.

Resource and Reference Materials	Continued and Additonal
Publications: Audio-Visual: Community: Local journalist	1. Develop list of all ships rights" defini 2. Study further into t check" from doing wh

als	Continued and Additonal Suggested Learning Experiences
	1. Develop list of all possible areas where "ownerships rights" definitely harm others. 2. Study further into the ways owners are "held in check" from doing what they want in industry.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

1. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processed.

Discipline Area Ind

Subject Pla

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: The student will produce a flow chart of 3 types of plastics showing sun energy to be the basic source. Affective: The student will realize the importance of the sun energy to plastics. Skills to be Learned 1. Types of plastics 2. Flow charts 3. Researching	I. Student-Centered in class activity A. Have on hand a number of examples of different types of plastics, with type written on. B. What do these plastics have in common? C. Divide students into small groups & have them back trace their particular type. (see origin of plastics chart) attach. D. With class discussion emphasize importance of "sun energy" as it relates to life processes. 1. What role does the sun play in the origin of plastics? 2. Would it be possible to have plastics without the sun? Why? 3. What effects does the sun have in plastics?

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ngs can use

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Origin of Plastics Grade 9-12

S	SUGGESTED LEARNING EXPERIENCES	
	I. Student-Centered in class activity A. Have on hand a number of examples of different types of plastics, with type written on. B. What do these plastics have in common? C. Divide students into small groups & have them back trace their particular type. (see origin of plastics chart) attach. D. With class discussion emphasize importance of "sun energy" as it relates to life processes. 1. What role does the sun play in the origin of plastics? 2. Would it be possible to have plastics without the sun? Why? 3. What effects does the sun have in plastics?	II. Outside Resource and Community Activities 1. School chemistry teacher. 2. Representative from plastics industry.

Resource and Reference Materials	Continued and Additonal Sugg
Publications: Woodworker Annual, Volume 73, V. J. Taylor, Drake Publishers, 440 Park Ave. South New York, N.Y. 10016 Plastics Technology, Robert S. Swanson, McKnight & McKnight Bloomington, Ill. General Plastics Proj & Proc. Raymond Cherry, McKnight & McKnight, Bloomington, Ill. Audio-Visual: #51778 Origin & Synthesis of Plastic Materials, Univ. Of Ill. Champaign, Ill. community: 1. Chemistry instructor 2. Rep. plastic industry	1. Develop method of simp burning - smelling-scr of plastics PG.70 Woodworker Annua

als	Continued and Additonal Suggested Learning Experiences
,	1. Develop method of simple tests composed of burning - smelling-scratching to identify types of plastics PG.70 Woodworker Annual Vol 73
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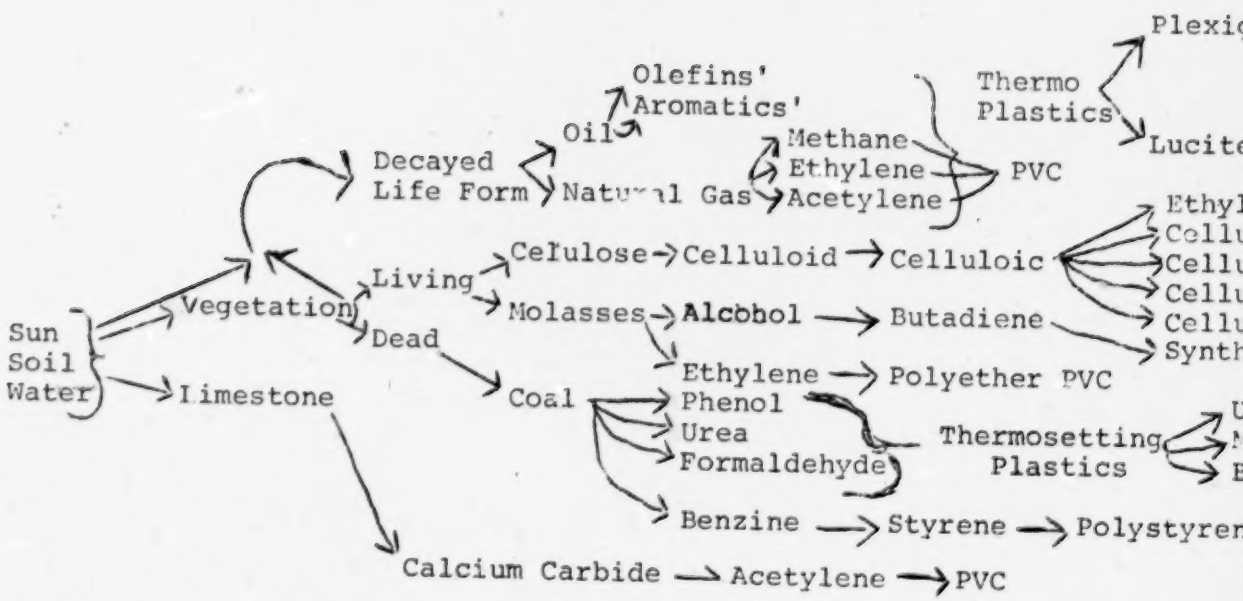
ORIGIN OF PLASTICS



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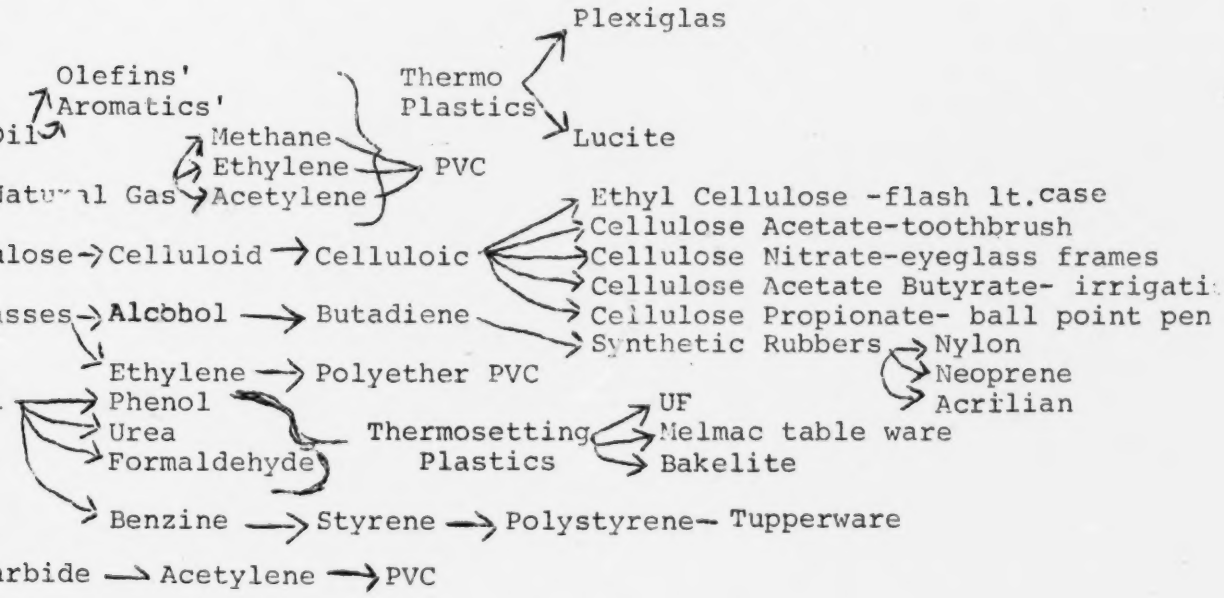

ESEA Title III - 59- 70-0135-2 Project I-C-E

CONCEPT		
	2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.	Discipline Ar Subject Problem Orien

BEHAVIORAL OBJECTIVES	SUGGESTED
Cognitive: The student will be able to define polymerization. The student will be able to diagram the polymerization process. Affective: The student will be able to visualize how people working together to build a community can be compared to polymerization. Skills to be Learned The process of polymerization. The working of an ecosystem.	I. Student-Centered in cla activity A. Define polymerizatio "Poly"-many "Meros"-parts B. Diagram how many par of monomer link toge to form new material C. Relate polymerizatio an ecosystem. 1. Compare individua molecules to indi people. 2. Compare linking o molecules to peop working together, ecosystem, in an system. 3. Compare links to which affect othe or job fields, re industries.

ganisms interact

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ing an intricate

osystem.

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Polymerization Grade 9-12

IVES	SUGGESTED LEARNING EXPERIENCES	
	I. Student-Centered in class activity A. Define polymerization "Poly"-many "Meros"-parts B. Diagram how many parts of monomer link together to form new material. C. Relate polymerization to an ecosystem. 1. Compare individual molecules to individual people. 2. Compare linking of molecules to people working together, in ecosystem, in an economic system. 3. Compare links to careers which affect other careers or job fields, related industries.	II. Outside Resource and Community Activities Chemistry teacher. Counselor-Job opportunities
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ystem.		

Resource and Reference Materials	Continued and Additional Sugge
Publications: Cope's Plastics Book, Dwight Cope Goodheart-Willcox General Plastics, Raymond Cherry McKnight & McKnight Job Opportunities Handbook Audio-Visual: Chemistry chart showing polymerization. Community: Chemistry teacher	

Continued and Additional Suggested Learning Experiences

CONCEPT

3. Environmental factors are limiting on the numbers of organisms living within their influence, thus, each environment has a carrying capacity.

Discipline Area Indu

Subject Plas

Problem Orientation

ESEA Title III -59-70-0135-2 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: The student will develop a chart listing the methods of joining plastics, examples of these methods, and breaking points of the joints. Affective: The student will realize that each joining method or system has a definite load limit that it can handle before failing. Skills to be Learned 1. Types and methods of plastic joinery 2. Joint testing and evaluation 3. Chart making	I. Student-Centered in class activity A. Demonstrate methods of joining plastics. (Show, tell, & do) 1. Cohesion a. Solvent cementing b. Thermal welding 2. Adhesion a. Adhesive (different from either of materials) 3. Mechanical linkage a. Screws b. Rivets c c. Bolts & nuts d. Spring clips B. Using equipment available, test to determine how much of a load each joint will carry before failing. C. By brainstorming, relate carrying capacity of joints to carrying capacity of examples in our environment 1. Street--can handle only so much before problems (Con't)

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Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Fastening of Plastics Grade 10-12

S	SUGGESTED LEARNING EXPERIENCES	
s	I. Student-Centered in class activity A. Demonstrate methods of joining plastics. (Show, tell, & do) 1. Cohesion a. Solvent cementing b. Thermal welding 2. Adhesion a. Adhesive (different from either of materials) 3. Mechanical linkage a. Screws b. Rivets c c. Bolts & nuts d. Spring clips B. Using equipment available, test to determine how much of a load each joint will carry before failing. C. By brainstorming, relate carrying capacity of joints to carrying capacity of examples in our environment. 1. Street--can handle only so much before problems (Con't)	II. Outside Resource and Community Activities A. Chemistry teacher B. Representative of plastics industry (ie, DuPont, etc.) C. Various local people discussing area job possibilities.

Resource and Reference Materials	Continued and Additional Suggested Le
Publications: 1. Plastics Technology, Robert E. Swanson McKnight & McKnight 2. General Plastics, Raymond Cherry McKnight & McKnight Audio-Visual: 1. Actual Samples of joints 2. Transparency series Community: Plastics Industry Rep. (ie, DePont) A. Schwichtenberg- Polyfoam Lester Irarie, Minn.	(Con't from I.) occur. 2. Water main--(same) 3. Job opportunities--load limit 1. Create larger chart for class a. Types of joints b. Methods of making them c. Breaking points 2. Have students find samples of types of joints and use these chart (#1) to produce multi-me 3. Have students perform same typ other materials used in indust present their results. 4. Prepare list of standard faste for plastics as well as other

Continued and Additional Suggested Learning Experiences

(Con't from I.)

occur.

2. Water main--(same)
3. Job opportunities--load limit in local community.

1. Create larger chart for class room use of
   a. Types of joints
   b. Methods of making them
   c. Breaking points
2. Have students find samples of different types of joints and use these to supplement chart (#1) to produce multi-media display
3. Have students perform same type of research with other materials used in industrial arts and present their results.
4. Prepare list of standard fasteners that are used for plastics as well as other materials.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 4 An adequate supply of pure water is essential for life.

Discipline Area Industrial

Subject Plastics

Problem Orientation Mold Re

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	
Cognitive: The student will be able to list and demonstrate the various methods of mold release. Affective: The student will select the simplest, yet best method, of mold release for the item he is producing. Skills to be Learned Methods of mold release. Methods to reclaim water used in the mold release process.	I. Student-Centered in class activity A. Methods of mold release 1. Water 2. Air 3. Ejection B. In the study of water mold release, the student will list the pollutants added to water by this process. 1. Heat 2. Polyvinyl alcohol 3. Plastic particles. C. Students will develop plan to reclaim water used in the mold release process. 1. Distillation 2. Secondary treatment D. Students will present debate or defend "their plan" to the class or teacher.	II. Ou Co Re th En ag

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Mold Release Grade 9-12

SUGGESTED LEARNING EXPERIENCES

-Centered in class
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he study of water mold
ase, the student will
the pollutants added
ater by this process.
eat
olyvinyl alcohol
lastic particles.
ents will develop
to reclaim water used
he mold release process.
istillation
econdary treatment
ents will present de-
or defend "their plan"
he class or teacher.

II. Outside Resource and Community Activities

Rep. from an area plant that does plastic molding.

Engineer from local sewage treatment plant.

Resource and Reference Materials	Continued and Addit
Publications: Fiber Glass Projects and Procedures Gerald L. Steele McKnight & McKnight	
Audio-Visual: Teacher developed slides	
Community: Rep. from an area plastic molding plant. Engineer from local sewage treatment plant.	

s	Continued and Additional Suggested Learning Experiences
ures	
t-	

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 5 An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Discipline Area: Industr

Subject: Plastic

Problem Orientation: Plas Trea

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING E
Cognitive: Given a specific air cleaning task, the student will be able to select a "plastic" that best suits the job & explain how it will clean the air. Affective: The student will understand the qualities a "plastic" must possess to remove particulants from dirty air. Skills to be Learned 1. Filtration principles 2. Uses of plastic products for air filitration 3. Limitations of plastics & filtration 4. Research techniques	I. Student-Centered in class activity A. Bean bag discussion: How are plastics used to purify air--give a specific example 1. Furnace filters 2. Vacumn cleaner filter 3. Cigarette filters 4. Respirator masks 5. Air filter on car 6. Glass PAC mufflers 7. Exhaust fan hoods B. Research the above applications & discover what properties must the plastic fibers have? C. Develop charts using the researched properties. Each group assigned or volunteer to research one type of filter. D. Given a specific air cleaning task select from chart or research & select a plastic that would best suit the job. (Con't)

II.

clean air is

organisms

ugh respiration,

in their food.

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Plastic and Air Treatment

Grade 9-12

S	SUGGESTED LEARNING EXPERIENCES	
ic	I. Student-Centered in class activity A. Bean bag discussion: How are plastics used to purify air--give a specific example 1. Furnace filters 2. Vacumn cleaner filter 3. Cigarette filters 4. Respirator masks 5. Air filter on car 6. Glass PAC mufflers 7. Exhaust fan hoods B. Research the above applications & discover what properties must the plastic fibers have? C. Develop charts using the researched properties. Each group assigned or volunteer to research one type of filter. D. Given a specific air cleaning task select from chart or research & select a plastic that would best suit the job. (Con't)	II. Outside Resource and Community Activities A. Selected students will interview local industries to discover what particular filtration (both liquid & air) devices they use, and obtain examples where possible. Sample questions for the interview: 1. What particular air pollution do you have at this plant? 2. How are you controlling this problem? 3. How successful have your efforts been? B. Air filtration specialist (heat, & vent,contractor)
ts		
s		

Resource and Reference Materials	Continued and Additional Suggested
Publications: Literature from various filter manufacturers. Audio-Visual: Teacher developed transpancy set. Community: 1. Heat & vent contractor	(Con't from I.) E. Presentation by "air filitrati plastics can clean the air. 1. Develop a collection of plasti 2. The students will organize a c filter drive, to promote bette Results: A. Efficiency increased B. Shorter burn time-less air C. Cost reduction in operation 3. Develop test to measure amount particulant removed by various devices"

ed and Additional Suggested Learning Experiences

t from I.)

esentation by "air filitration" expert how
astics can clean the air.

velop a collection of plastic filtration media.

e students will organize a clean your furnace
lter drive, to promote better furnace operation.

sults:

- Efficiency increased
- Shorter burn time-less air pollution.
- Cost reduction in operation.

velop test to measure amount or % of
rticulant removed by various "air filtering
vices"

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 6. Natural resources are not equally distributed over the earth or over time and greatly affect the geographic conditions and quality of life.

Discipline Area Indu
Subject Plas
Problem Orientation
Serving as Co

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: The student will list 10 products which are now made of plastic (previously made of another material) and project 4 possible reasons why the change was made. Affective: The student will realize that changing the material a product is made of also changes in many instances, the geographic area in which it is produced. Skills to be Learned 1. Types & uses of plastic products. 2. Composition of plastics. 3. Geographic locations of natural resources 4. Geographic locations of raw materials used in the manufacture of plastics.	I. Student-Centered in class activity A. Brainstorm list of products now made of plastic formerly made of other natural resources. 1. Wood--counter & table tops, paneling, bldg. exteriors 2. Metal--Desks, auto bodie engine & auto. parts, window wash frames 3. Glass--plexiglass, dishe containers. B. Develop flow chart, & compare geog. locations of plastic raw products and natural resources. C. Research plant locations producing various plastic products, & map them in contrast to locations of plastic raw materials D. Study results of work in portion C. E. Relate results and conclusions of study (part D) to (Con't)

sources are not equally

er the earth or over

ly affect the geographic

quality of life.

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Plastic Products Grade 8-12
Serving as Conservers of Natural Resources

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
student ducts de of sly material) ssible change tudent t changing roduct changes s, the in uced.	I. Student-Centered in class activity A. Brainstorm list of products now made of plastic formerly made of other natural resources. 1. Wood--counter & table tops, paneling, bldg. exteriors 2. Metal--Desks, auto bodies engine & auto. parts, window wash frames 3. Glass--plexiglass, dishes, containers. B. Develop flow chart, & compare geog. locations of plastic raw products and natural resources. C. Research plant locations producing various plastic products, & map them in contrast to locations of plastic raw materials D. Study results of work in portion C. E. Relate results and conclusions of study (part D) to (Con't)	II. Outside Resource and Community Activities A. Representative of local plastics manufacturing industry. B. Chamber of Commerce.
rned of plastic f plastics. cations of rces cations of used in e of plas-		

Resource and Reference Materials	Continued and Additional Suggested Learnin
Publications: Wisconsin Geography Dept. of Public Instruction 126 Langlon St. Madison, Wis.	1. Have students find information on a gi ghost-town, and try to retrace the ste which led to it's becoming a ghost tow a. Commercial factors b. Accessability c. Natural resources, etc.
Audio-Visual: Film Basic Elements of Production #60196, U. of Ill. Champaign, Ill.	
Community: 1. Plastics manufacturing personnel (if possible) 2. Chamber of Commerce individual to explain in-coming or outgoing industries and their effect on the community and quality of life.	

Continued and Additional Suggested Learning Experiences

1. Have students find information on a given ghost-town, and try to retrace the steps which led to it's becoming a ghost town.
   a. Commercial factors
   b. Accessability
   c. Natural resources, etc.

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

Discipline Area I

Subject P

Problem Orientatic Use

BEHAVIORAL OBJECTIVES	SUGGESTED LEAR
Cognitive: The student will be able to list ten plastic products used in leisure time vehicles. Affective: The student will understand how plastic has changed the leisure time vehicle industry. Skills to be Learned Uses of plastic in transportation. How the plastic industry has changed the economy.	I. Student-Centered in class activity A. Students will develop a list of plastic products used in leisure time vehicles. 1. Snowmobile bodies 2. Boats 3. ALT vehicles 4. Dune buggy B. Students will study those items listed which are produced in their area and how they have changed population and economic conditions.

ors such as facilitating

tation, economic conditions,

on growth, and increased

time have a great influence
es in land use and centers
ation density.

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation How Plastic is Used in Leisure Time Vehicles

Grade 9-12

ORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
The student e to list products sure time The student tand how changed time ustry.	I. Student-Centered in class activity A. Students will develop a list of plastic products used in leisure time vehicles. 1. Snowmobile bodies 2. Boats 3. ALT vehicles 4. Dune buggy B. Students will study those items listed which are produced in their area and how they have changed population and economic conditions.	II. Outside Resource and Community Activities A. Rep. from area plant which produces plastic products used in leisure time vehicles. B. Students interview local businessmen in companies recently affected. C. Students contact local and nearby Chambers of Commerce for population & economic changes per products developed.
e Learned stic in ion. stic industry the economy.		

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: Fiber Class Projects and Procedures, Gerald L. Steele McKnight & McKnight Plastics Technology, Robert S. Swanson McKnight & McKnight Audio-Visual: Plastics and Fiberglass: University of Ill. Champaign, Ill. Community: Rep. from area plastics plant.	

ls	Continued and Additional Suggested Learning Experiences

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 8. Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

Discipline Area Indu

Subject Plas

Problem Orientation P
F

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNIN
Cognitive: Given a sample mixture of furniture parts made of wood and plastic, the student will be able to separate the plastic parts from the wood parts. Affective: The student will realize the place of plastic in the furniture industry and change his attitudes to accept them. Skills to be Learned How to distinguish between furniture parts made of wood and plastic. How plastic is used in furniture. How the use of plastic affects the cost of furniture.	I. Student-Centered in class activity A. Students will develop a list of ways plastic is used in furniture. 1. Tops 2. Finish 3. Drawers 4. Doors 5. Legs 6. Applique. B. From the list developed in A, students will develop a list of reasons for the use of plastic in furniture and individual furniture parts. 1. Cost 2. Durability 3. Appearance C. Students will be shown examples of identical furniture parts made of wood or plastic. Students discuss: (Con't)

economic, social,

factors determine

's values and attitudes

vironment.

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Plastics in Furniture

Grade 9-12

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
en a of made of c, the able to astic wood parts. student e place of furni- nd change o accept	I. Student-Centered in class activity A. Students will develop a list of ways plastic is used in furniture. 1. Tops 2. Finish 3. Drawers 4. Doors 5. Legs 6. Applique. B. From the list developed in A, students will develop a list of reasons for the use of plastic in furniture and individual furniture parts. 1. Cost 2. Durability 3. Appearance C. Students will be shown examples of identical furniture parts made of wood or plastic. Students discuss: (Con't)	II. Outside Resource and Community Activities Rep. from area plastic moldings plant. Local furniture dealer.
arned ish re parts d plastic. used in plastic t of		

Resource and Reference Materials	Continued and Additional Suggested L
Publications: Advanced Woodworking and Furniture Making, John I. Feirer & Gilbert Hutchings Chas. A. Bennett Co. Fiber Glass Projects and Procedures, Gerald L. Steele McKnight & McKnight Audio-Visual: Plastics: Industrial Processes and Products, #86000 U. of Ill., Champaign, Ill Community: Rep. from area plastic molding plant. Local furniture dealer.	(Con't from I.) 1. How can you recognize plastic pa marks, etc.) 2. How does the use of plastic chan furniture? D. Students will be given several f and asked to identify the materi of.

e Materials	Continued and Additional Suggested Learning Experiences
and ert Hutchings and Processes , Ill c molding r.	(Con't from I.) 1. How can you recognize plastic parts? (By mold marks, etc.) 2. How does the use of plastic change our values of furniture? D. Students will be given several furniture parts and asked to identify the material they are made of.

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT - 9. Man has the ability to manage, maripulate, and change his environment.

Discipline Area Industrial Art

Subject Plastics

Problem Orientation Plastic Ide ification &

BEHAVIORAL OBJECTIVES	SUGGESTTED LEARNING EXPERIEN
Cognitive: The student will test 4 samples & correctly identify them; recycle the thermoplastics, suggest at least 2 2nd lives for the thermosets & explain how his actions relate to his environment. Affective: The student will realize that the cost of injection & thermoforming projects can be held down by the addition of recyleable plastics. Skills to be Learned 1. Testing plastics 2. Recycling procedure 3. Letter writing 4. Brainstorming	I. Student-Centered in class activity A. Each student will bring a sample of three different disposable plastic containers & if possible discover who manufactures them. B. Test the samples in class to determine if the plastic is: 1. Thermoplastic (Recycleable) 2. Thermoset (Non-Recycleable) 3. Identify-specific type. C. Since the thermoplastic is recycleable it presents no problem. D. Thermosetting plastic does present a problem 1. Why does the manufacturer use this type? Write & ask. (Con't)

II. Outsi Commu
1. Art
2. Rep pla dis cul

~~is the ability to manage,~~

, and change his

it.

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Plastic Identification & Recycling Grade 7-12

OBJECTIVES	SUGGESTTED LEARNING EXPERIENCES	
ne student amples & ntify them; hermoplastics, ast 2 2nd lives nosets & explain ons relate to nt. ill realize : of injection ng projects down by the ecyleable	I. Student-Centered in class activity A. Each student will bring a sample of three different disposable plastic containers & if possible discover who manufactures them. B. Test the samples in class to determine if the plastic is: 1. Thermoplastic (Recycleable) 2. Thermoset (Non-Recycleable) 3. Identify-specific type. C. Since the thermoplastic is recycleable it presents no problem. D. Thermosetting plastic does present a problem 1. Why does the manufacturer use this type? Write & ask. (Con't)	II. Outside Resource and Community Activities 1. Art teacher 2. Representative from plastics industry to discuss their particular recycling efforts.
Learned lastics procedure iting ming		

Resource and Reference Materials	Continued and Additional Suggested Learni
Publications: Woodworkers Annual Vol. 73, V.J. Taylor Drake Pub. Ltd. General Plastics, Raymond Cherry, McKnight & McKnight, Bloomington, ILL. Audio-Visual: Teacher/student developed charts-displays-transparencies	(Con't from I.) 2. Brainstorm alternative 2ndllives. A. Birdhouses B. Art forms C. Household uses E. In groups define specific reasons why be concerned about the problem presente (Results should relate directly to con F. Recycle thermoplastics in shop procedu Test design--see attached sheet

Materials	Continued and Additional Suggested Learning EXperiences
73, td. d LL. d encies	(Con't from I.) 2. Brainstorm alternative 2ndllives. A. Birdhouses B. Art forms C. Household uses E. In groups define specific reasons why we should be concerned about the problem presented in D-2? (Results should relate directly to concept #9) F. Recycle thermoplastics in shop procedure Test design--see attached sheet

FIELD TESTED
TEST DESIGN

From Sample Cut
Off Thin Sliver

If The Result is Powdery
Chips it is a Thermosetting
Plastic

Attempt to Light
The Sliver

If the Smell is Phenolic
& The Sliver Turns Dark
Brown/Black=Phenoformalde-
hyde

If The Smell Is Fishy &
The Sliver Is White Or
Brightly Colored=Urea/
Melamine Formaldehyde

If T
It I
Conf
Hot
Shou

Drop
Hard
Of A

If t
Then
Burn
The

Single Smell Of
Styrene=Polysty-
rene

If The Noise Is Dull
Place The Sliver In Soapy
Water

Floats It Is A
Polyolefin
Type

Scratch With
Fingernail

Sinks, Burn A Small
Piece & Observe The
Flame & Ease Of Burning

Burns With A Yellow
Flame-Blow Out the Flame
& Smell

Burns Wit
Note Colo
Ignited

FIELD TESTED
TEST DESIGN

From Sample Cut
Off Thin Sliver

is Powdery
Thermosetting

ht

s Phenolic
Turns Dark
enoformalde-

If The Smell Is Fishy &
The Sliver Is White Or
Brightly Colored=Urea/
Melamine Formaldehyde

If The Sliver Cut Smoothly
It Is a Thermoplastic (To
Confirm, Place a Piece Of
Hot Metal To The Sliver It
Should Melt Or Go Soft)

Drop The Sliver on To A
Hard Surface From A Height
Of About 2½ To 3'.

If the Noise Is Metallic
Then It Is Styrene Base.
Burn The Sliver & Smell
The Smoke.

If The Noise Is Dull
Place The Sliver In Soapy
Water

Single Smell Of
Styrene=Polysty-
rene

Bitter Smell As Well
As Styrene With A
Smell of Rubber=
ABS Co. Polymer

Sinks, Burn A Small
Piece & Observe The
Flame & Ease Of Burning

Burns With A Yellow
Flame-Blow Out the Flame
& Smell

Burns With Difficulty
Note Color Of Flame While
Ignited

(Continued)

If It Will Not Scratch=Polypropylene

Scratches A Little= H.D. Polyethylene

Scratches Easily= C. D. Polyethylene

A Smell Like Methylated Spirits=Acrylic

A Smell Of Burning Paper= Cellulose Acetate

Acidic Plus A Smell Of Rancid Butter=Cellulose Acetate Butyrate

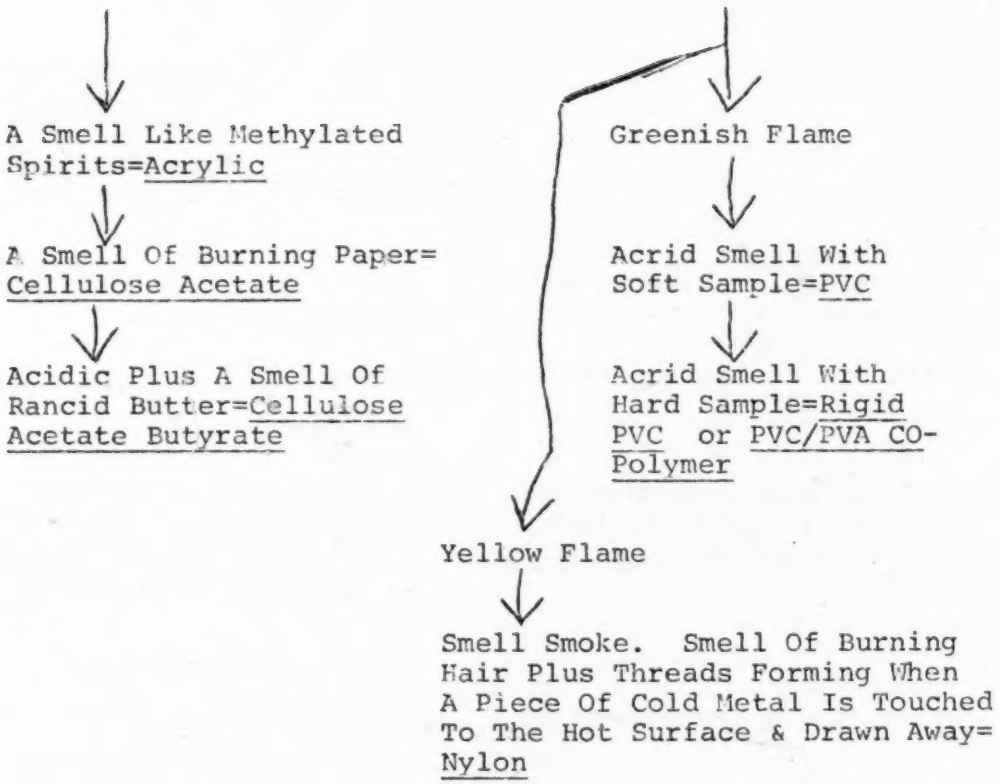
Greenish

Acrid Sme
Soft Samp

Acrid Sme
Hard Samp
PVC or
Polymer

Yellow Flame

Smell Smoke. Smell
Hair Plus Threads
A Piece Of Cold Me
To The Hot Surface
Nylon


A Smell Like Methylated Spirits=Acrylic
A Smell Of Burning Paper= Cellulose Acetate
Acidic Plus A Smell Of Rancid Butter=Cellulose Acetate Butyrate
Greenish Flame
Acrid Smell With Soft Sample=PVC
Acrid Smell With Hard Sample=Rigid PVC or PVC/PVA CO-Polymer
Yellow Flame
Smell Smoke. Smell Of Burning Hair Plus Threads Forming When A Piece Of Cold Metal Is Touched To The Hot Surface & Drawn Away= Nylon

Pel 7/72

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

C 10. Short-term economic gains

O

N may produce long-term environmental

C

E losses.

P

T

Discipline Area Industrial

Subject Plastics

Problem Orientation Disposal
Plastic

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI	
Cognitive: The student will list the ways plastic has replaced wood, metal, and glass due to economic factors. The student will list the problems of plastic disposal. Affective: The student will buy products made of recyclable materials rather than thermoplastics. Skills to be Learned Methods of disposal of used wood, metal, glass and plastic products.	I. Student-Centered in class activity A. Students will develop a list of products once made of metal, wood or glass and now, because of economic factors, made of plastic. B. Students will study methods of disposing of used products made of wood, metal, glass, & plastic. 1. Metal-recycle 2. Glass-recycle 3. Wood-burn, salvage 4. Plastic A. Thermoset B. Thermoplastic-recycle C. Students will study the problem of disposal of thermosetting plastics, 1. Study current problems of disposal A. Can not burn in normal fire. B. Does not decay C. Non-recyclable (Con't)	II. Outs Comm Oper cent Visi

ins

onmental Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Disposal of Used Plastic Products Grade 9-12

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Students will develop a list of products once made of metal, wood or glass and now, because of economic factors, made of plastic.
   B. Students will study methods of disposing of used products made of wood, metal, glass, & plastic.
      1. Metal-recycle
      2. Glass-recycle
      3. Wood-burn, salvage
      4. Plastic
         A. Thermoset
         B. Thermoplastic-recycle
   C. Students will study the problem of disposal of thermosetting plastics,
      1. Study current problems of disposal
         A. Can not burn in normal fire.
         B. Does not decay
         C. Non-recyclable (Con't)

II. Outside Resource and Community Activities
   Operator of Recycling center.
   Visit a hammer mill.

Resource and Reference Materials	Continued and Additional Suggested Learn
Publications: Plastics Technology, Robert S. Swanson McKnight & McKnight Audio-Visual: Plastics: Industrial Processes and Products #86000 U. of Ill. Champaign, Ill Community: Operator of recycling center	2. Develop possible methods of disposal

Continued and Additional Suggested Learning Experiences

2. Develop possible methods of disposal.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area Industria

Subject Plastics

Problem Orientation Recycl

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXP	II. O C
Cognitive: The student will list 4 advantages of recycling thermoplastics & how his actions affect the environment. Affective: The student will understand the cause-effect relationship utilized in recycling thermoplastics Skills to be Learned 1. Preparing material for recycling 2. Operation of the grandulator 3. Testing plastics 4. Record keeping	I. Student-Centered in class activity This activity is a continuation of class activity from concept #10. A. Students will wash & remove all labels, metal rings, etc from plastic articles collected from school, home & community periodic collection. B. Separate according to type of plastic & prepare them for the granulator & granulate C. Weight material & enter weight & date on chart D. At the end of the year add total weight column & compute cost of mat'rl recycled. Find per pupil input. E. Class discussion of concept #11 as it relates to class recycling effort a. Money saved (con't)	1. 2. 3. 4.

trial Arts

ics

cycling PlasticsGrade 7-12

EXPERIENCES

I. Outside Resource and Community Activities

1. Sanitary engineer
2. Chemistry teacher
3. Rep. from plastic industry.
4. Set up collection stations for "throw away" plastic articles & maintain same.

Resource and Reference Materials	Continued and Additional Suggested
Publications: Woodworkers Annual Vol 73 V. J. Taylor Drake Pub. Ltd. 440 Park Ave. South, N.Y. 10016 General Plastics, Raymond Cherry McKnight & McKnight Bloomington, Ill. Audio-Visual: Garbage, Project I-C-E KMC Community: 1. Sanitary engineer 2. Chemistry teacher 3. Rep. from plastics industry	(Con't from I.) b. Mat'rl saved C. Land fill effect d. Conservation of natural resour 1. Do long term record keeping ov a greater impact value is deve

Continued and Additional Suggested Learning Experiences

(Con't from I.)

b. Mat'rl saved
C. Land fill effect
d. Conservation of natural resources

1. Do long term record keeping over the years so that a greater impact value is developed.

ESEA Title III - 59-70-0135-2 Project I-C-E

C O N C E P T 12. Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.

Discipline Area Industrial

Subject Plastics

Problem Orientation Rights

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE	
Cognitive: The student will list 3 consequences that might result if the previous "owner" encroached on his rights. List cause & effect. Affective: The student will realize that his actions determine not only project & work of all of his classmates. Skills to be Learned 1. Proportions 2. Accuracy in measuring 3. Set-up times of resins 4. Responsibility of own actions.	I. Student-Centered in class activity Understanding should be realized that when a person is working in an individual effort, the materials, machines, tools etc. he is using are "his" to use until he is finished. He is also responsible for these materials. Thus, the student is the "owner" of items or materials being used. A. Demonstration & explanation by teacher on fiberglass resin-mix preparation 1. Ingredients (simple) 2. a. Resin b. Hardener B. Discussion of failures as a result of improper prepartion. 1. If "owner" is not careful and gets resin or hardener into main storage of other, the (Con't)	II. Ou Co

must be

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on or

right of

Discipline Area Industrial Arts

Subject Plastics

Problem Orientation Rights Of Others Grade 10-12

SUGGESTED LEARNING EXPERIENCES	
I. Student-Centered in class activity Understanding should be realized that when a person is working in an individual effort, the materials, machines, tools etc. he is using are "his" to use until he is finished. He is also responsible for these materials. Thus, the student is the "owner" of items or materials being used. A. Demonstration & explanation by teacher on fiberglass resin-mix preparation 1. Ingredients (simple) 2. a. Resin b. Hardener B. Discussion of failures as a result of improper prepartion. 1. If "owner" is not careful and gets resin or hardener into main storage of other, the (Con't)	II. Outside Resource and Community Activities

Resource and Reference Materials	Continued and Additional Suggested L
Publications: Fiber-Glass Gerald L. Steele McKnight & McKnight Audio-Visual: Resin Mixing Ingredients in Singular Form, & Comparison Display in Mixed Form Community:	(Con't from I.) entire mass will be worthless, & no will be able to use it. 2. If batch of resin is not thoroug resin & resulting product will b Stress--each person's project or wo upon past performances of other stu 3. Discover as many areas as possib by one individual will affect ma

Materials	Continued and Additional Suggested Learning Experiences
ts in rison	(Con't from I.) entire mass will be worthless, & no other student will be able to use it. 2. If batch of resin is not thoroughly mixed, the resin & resulting product will be worthless. Stress--each person's project or work is dependent upon past performances of other students or "owners" 3. Discover as many areas as possible where neglect by one individual will affect many others.

ESEA Title III - 59-70-0135-2 Project I-d-E

CONCEPT

1. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

Discipline Area: Industrial A

Subject: Electricity-

Problem Orientation: Applicatio Energy

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI
Cognitive: The student will develop an experiment using sun energy & explain how his results can be applied to our technological society. Affective: The student will describe several problems in using sun energy Skills to be Learned 1. Experiment design 2. Cause-effect thinking 3. Testing 4. Brainstorming 5. Circuitry & wiring	I. Student-Centered in class activity A. Telephone company rep. presentation "uses of sun energy" B. Film presentation 1. Electrical sources 2. Production C. Read related text units D. The students will write a philosophical (dream) paper on sun energy use & its application to our society. E. By individuals or small groups develop sun energy experiments F. Suggest several environmental problems associated with construction & operations of solar energy power generators as described in July 1972 Popular Science G. Review use of Solar energy on space probe vehicles by NASA
	II. Outs Comm 1. T 2. I 3. W 4. P 5. I

nergy from the sun, the basic

e of all energy, is converted

igh plant photosynthesis into

m all living things can use
ife processes.

Discipline Area Industrial Arts

Subject Electricity-Electronic

Problem Orientation Application of Sun Energy Grade 7-12

AVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e: The student elop an experi- ng sun energy n how his results pplied to our gical society. e: The student cribe several in using sun	I. Student-Centered in class activity A. Telephone company rep. presentation "uses of sun energy" B. Film (presentation 1. Electrical sources 2. Production C. Read related text units D. The students will write a philosophical (dream) paper on sun energy use & its application to our society. E. By individuals or small groups develop sun energy experiments F. Suggest several environmental problems associated with construction & operations of solar energy power generators as described in July 1972 Popular Science G. Review use of Solar energy on space probe vehicles by NASA	II. Outside Resource and Community Activities 1. Telephone Co. 2. Local power co. 3. Weather man 4. Physics teacher 5. In the community the students will locate direct uses of sun energy
o be Learned iment design -effect thinking ng storming uitry & wiring		

Resource and Reference Materials	Continued and Additional Suggested Learning
Publications: Modern General Shop , Walter Irown Goodheart-Willcox Co. Popular Science, July 1972 Audio-Visual: #53623 Electricity: Electrical Sources #62900 Electricity: Production Univ. Of Ill, Champaign,Ill. Community: 1. Telephone Co. 2. Local power co. 3. Weather co. 4. Physics teacher Bell telephone educational representatives 1-922-5211 Collect call Miss A. Hoey Fond Du Lac for available supplies & films	1. Continue developing experiments that show greatest potential & possible patent and/o Solar generation will require large amount radiation regularly available. Agricultur industrial development in this (desert typ can cause climatic change that reduces the conversion capacity of the solar generatio

terials	Continued and Additional Suggested Learning Experiences
	1. Continue developing experiments that show the greatest potential & possible patent and/or copyright. Solar generation will require large amounts of solar radiation regularly available. Agricultural or industrial development in this (desert type) area can cause climatic change that reduces the efficient conversion capacity of the solar generation bank.
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trical	
uction Ill.	
al ll y e	

ESEA Title III - 59-70-0135-2 Project I-d-E

CONCEPT 1. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

Discipline Area Industrial

Subject Electricit

Problem Orientation Applicat Energy

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPE
Cognitive: The student will develop an experiment using sun energy & explain how his results can be applied to our technological society. Affective: The student will describe several problems in using sun energy Skills to be Learned 1. Experiment design 2. Cause-effect thinking 3. Testing 4. Brainstorming 5. Circuitry & wiring	I. Student-Centered in class activity A. Telephone company rep. presentation "uses of sun energy" B. Film (presentation 1. Electrical sources 2. Production C. Read related text units D. The students will write a philosophical (dream) paper on sun energy use & its application to our society. E. By individuals or small groups develop sun energy experiments F. Suggest several environmental problems associated with construction & operations of solar energy power generators as described in July 1972 Popular Science G. Review use of Solar energy on space probe vehicles by NASA

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Discipline Area Industrial Arts

Subject Electricity-Electronic

Problem Orientation Application of Sun Energy Grade 7-12

ECTIVES	SUGGESTED LEARNING EXPERIENCES	
lent peri- gy esults ur ty. ient al un	I. Student-Centered in class activity A. Telephone company rep. presentation "uses of sun energy" B. Film (presentation 1. Electrical sources 2. Production C. Read related text units D. The students will write a philosophical (dream) paper on sun energy use & its application to our society. E. By individuals or small groups develop sun energy experiments F. Suggest several environmental problems associated with construction & operations of solar energy power generators as described in July 1972 Popular Science G. Review use of Solar energy on space probe vehicles by NASA	II. Outside Resource and Community Activities 1. Telephone Co. 2. Local power co. 3. Weather man 4. Physics teacher 5. In the community the students will locate direct uses of sun energy
ed in nking		
ng		

Resource and Reference Materials	Continued and Additional S
Publications: Modern General Shop , Walter Irown Goodheart-Willcox Co. Popular Science, July 1972 Audio-Visual: #53623 Electricity: Electrical Sources #62900 Electricity: Production Univ. Of Ill, Champaign,Ill. Community: 1. Telephone Co. 2. Local power co. 3. Weather co. 4. Physics teacher Bell telephone educational representatives 1-922-5211 Collect call Miss A. Hoey Fond Du Lac for available supplies & films	1. Continue developing expe greatest potential & pos Solar generation will re radiation regularly avai industrial development i can cause climatic chang conversion capacity of t

ontinued and Additional Suggested Learning Experiences

Continue developing experiments that show the greatest potential & possible patent and/or copyright.

Solar generation will require large amounts of solar radiation regularly available. Agricultural or industrial development in this (desert type) area can cause climatic change that reduces the efficient conversion capacity of the solar generation bank.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.

Discipline Area Industr

Subject Electri

Problem Orientation Rela
The Electrical Circu

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING E
Cognitive: The student will in writing compare a community to an electrical circuit and explain what happens if one part stops, changes, etc. Affective: The student will realize the interaction of the electrical circuit & the effects if one or more fail. Skills to be Learned: 1. Principles of an electrical circuit 2. Systems analysis 3. Primary circuit elements A. Volts B. Amps C. Ohms	I. Student-Centered in class activity A. Film presentations: 1. Flow of electricity 2. Elementals of electrical circuits B. Using components develop & explain a simple electrical circuit. Teacher or student. C. Have students identify circuit components 1. Power 2. Load 3. Return wire 4. Gauges 5. Protection D. Evaluate circuit Test - Result 1. Design - Works 2. Vary Load-Blow fuse Burn wire 3. Vary power-Load doesn't work 4. Break circuit-Won't work E. Compare circuits to a community, class discussion, groups, or homework (Con't)

II.

iscipline Area Industrial Arts

bject Electricity-Electronic

roblem Orientation Relationship of Grade 7-12
The Electrical Circuit to an Ecosystem

SUGGESTED LEARNING EXPERIENCES

ntered in class

esentations:
of electricity
entals of electri-
circuits
omponents develop
in a simple electri-
rcuit. Teacher or
.
tudents identify
t components
er
d
urn wire
ges
tection
te circuit
- Result
ign - Works
y Load-Blow fuse
Burn wire
y power-Load doesn't
k
eak circuit-Won't work
re circuits to a
nity, class discussion,
oups, or homework (Con't)

II. Outside Resource and Community Activities

A. Sociologist
B. Have students find examples in the community & relate them to the basic circuit & its function.

Resource and Reference Materials	Continued and Additional Suggested I
Publications: Interior Electric Wiring Kennard C. Graham American Tech. Society Chicago, Ill. Electrical Construction Wiring Walter N. Alerich American Tech. Society Chicago, Ill. Audio-Visual: Flow of Electricity, BAVI $29300 Elements of Electrical Circuits, Univ. of Ill. Champaign, Ill. Community: 1. Sociologist	1. Power=Food, fuel, etc. 2. Load=People, demand (Con't f 3. Return wire=Waste disposal 4. Gauges=Communication 5. Protection=Limiting factors avai food, etc.

and Additional Suggested Learning Experiences

Food, fuel, etc.
eople, demand (Con't from I. E.)
wire=Waste disposal
=Communication
tion=Limiting factors available land, housing,
etc.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 3. Environmental factors are limiting on the numbers of organisms living within their influence, thus, each environment has a carrying capacity.

Discipline Area Indu

Subject Elec

Problem Orientation D
Carr

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
Cognitive: Given a fixed power source, the student will experiment to find its maximum capacity, and then compute this capacity using mathematics. Affective: The student will realize that there is a limit to the load a circuit or system can handle. Skills to be Learned 1. Electrical computations 2. Load capacities 3. Function of fuses	I. Student-Centered in class activity A. Have each student load a fused (20 Amp) circuit with household applicances until it becomes overloaded 1. Toaster 2. Coffee pot 3. Electric fry pan, etc. B. Discuss circuit handling capacity, and how to compute Amps 1. Amps=Watts/volts 2. Sum of amps. drawn by each appliance cannot be larger than supply amperage. C. Have students design and set up different appliance combinations which will not overload circuit. D. Discuss safety factors concerning electrical house circuits 1. Nat. elec. code-80% of amperage maximum 2. Fire hazards (Con't)

s are limiting

sms living

thus, each

ng capacity.

Discipline Area Industrial Arts

Subject Electricity-Electronics

Problem Orientation Determining Carrying Capacities

Grade 7-12

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Have each student load a fused (20 Amp) circuit with household applicances until it becomes overloaded
      1. Toaster
      2. Coffee pot
      3. Electric fry pan, etc.
   B. Discuss circuit handling capacity, and how to compute Amps
      1. Amps=Watts/volts
      2. Sum of amps. drawn by each appliance cannot be larger than supply amperage.
   C. Have students design and set up different appliance combinations which will not overload circuit.
   D. Discuss safety factors concerning electrical house circuits
      1. Nat. elec. code-80% of amperage maximum
      2. Fire hazards

(Con't)

II. Outside Resource and Community Activities
   A. Electrician
   B. Have students survey neighborhood for hazardous electrical wiring situations, start a drive to re-work or have something done about inferior wiring facilities
   C. Public Service rep.
   D. Underwriters lab.

Resource and Reference Materials	Continued and Additonal Suggested Lea
Publications: Electricity, Goodheart-Wilcox Howard H. Gerrish Basic Electricity, McGraw Hill Paul B. Zbar Introduction to Electricity & Electronics, Delmar Loper & A.H.R. Audio-Visual: Transparencies to Aid Explanation of Ampere Computation Community: 1. Electrician 2. Public service rep. 3. Possibly rep.from Underwriters laboratory	(Con't from I.) E. Relate overloading problems to to of overcrowding and over-use of r products. 1. Conduct community wide drive to i area about overloading circuits, local people (especially in older update their electrical wiring sy

dditonal Suggested Learning Experiences

.)

rloading problems to today's problems
wding and over-use of resources &

mmunity wide drive to inform persons in
overloading circuits, and try to get
le (especially in older homes) to
ir electrical wiring systems.

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 4. An adequate supply of pure water is essential for life. (also can apply to concept #5)

Discipline

Subject

Problem Or

BEHAVIORAL OBJECTIVES	SUGGES
Cognitive: The student will be able to list 6 environmental losses caused by the production of electricity. Affective: The student will gain knowledge of environmental loss due to the production of electricity. Skills to be Learned How electricity is produced. How the production of electricity effects our environment. How to develop a questionaire.	I. Student-Centered in activity A. Class discussion electricity is p 1. What kinds of are produced produced by t of electricit 2. How much of t is produced? 3. What are the effects of th B. Students will mak bulletin board sh environmental los by producing one of electricity by 1. Burning fossil 2. Water power 3. Nuclear energy C. Students develop aire and conduct survey on the fol question: To reduce polluti by the production which would rathe (Con't)

pply of pure

for life.

concept #5)

Discipline Area Industrial Arts

Subject Electricity-Electronics

Problem Orientation Production of Electricity Grade 7-12

IVES	SUGGESTED LEARNING EXPERIENCES	
t on t duced. on-	I. Student-Centered in class activity A. Class discussion on how electricity is produced: 1. What kinds of pollution are produced by the produced by the production of electricity? 2. How much of this pollution is produced? 3. What are the environmental effects of this pollution? B. Students will make a bulletin board showing environmental losses caused by producing one mega-watt of electricity by 1. Burning fossil fuel 2. Water power 3. Nuclear energy C. Students develop questionaire and conduct community survey on the following question: To reduce pollution caused by the production of electricity which would rather do, (Con't)	II. Outside Resource and Community Activities A. Speaker from local power company. B. Field trips to hydro-plant, nuclear plant, and fossil fuel plant.

Resource and Reference Materials	Continued and Additional Suggeste
Publications: Environmental Cost of Electric Power, Scientists Institute for Public Information 30 E. 68th St. N. Y. , N. Y. 10021 National Wildlife, National Wildlife Federation April-May, 1972 P. 18 Audio-Visual; Electricity: How It Is Generated. #01136 U. of Ill. Champaign, Ill. Community: Rep. from local power company.	(Con't from I.) pay 1/5 more for electricity ea required to reduce use of elect each month? D. Construction of models of th of generating stations for p table display with environme associated with construction

Continued and Additional Suggested Learning Experiences

(Con't from I.)

pay 1/5 more for electricity each month, be required to reduce use of electricity by 1/5 each month?

D. Construction of models of the various types of generating stations for placement in sand table display with environmental impact effects associated with construction and operation of same.

ESEA Title III -59-70-0135-2 Project I-C-E

CONCEPT 6. Natural resources are not equally distributed over the earth or over time and greatly affect the geographic conditions and quality of life. (Also can apply to Concept 9)

Discipline Area Indust

Subject Electr

Problem Orientation Tra Electr

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
Cognitive: The student will be able to list 3 problems in moving electricity from production plant to consumer. The student will be able to list the natural resources used to produce electricity. Affective: The student will realize how the production of electricity has changed the environment.	I. Student-Centered in class activity A. Students will study how natural resource distribution affects methods of electricity production. 1. How is electricity produced in states that have large supplies of water? 2. How is electricity produced in states that have large supplies of coal? 3. How is electricity produced in states that have large supplies of oil or natural gas? 4. How is electricity supplied in areas that have none of the resources used to produce electricity? B. Students will study how man has manipulated his environment to produce and transmit electric power. (Con't)
Skills to be Learned How electrcity is produced. How the production of electricity affects our environment. How electric power is transmitted.	

II

iscipline Area Industrial Arts

ubject Electricity-Electronics

roblem Orientation Transmission of Electrical Energy. Grade 7-12

SUGGESTED LEARNING EXPERIENCES

ntered in class

s will study how
resource distri-
affects methods of
city production.
is electricity
uced in states
have large supplies
ater.
is electricity
uced in states
have large
lies of coal.
is electricity
uced in states
have large supplies
il or natural gas.
is electricity
lied in areas that
none of the
urces used to
uce electricity.
s will study how
manipulated his
ment to produce and
t electric power.

II. Outside Resource and Community Activities

Rep. from local power company.

Field trip to electric power plants of different types.

Resource and Reference Materials	Continued and Additional Suggested Lea
Publications: Environmental Cost of Electric Power, Scientists Institute for Public Information, 30 E. 68th St. N.Y., N.Y. National Wildlife, National Wildlife Federation April-May, 1972 p. 18 Audio-Visual: #50774 Dams University of Ill, Champaign, Ill. Community: Rep. from local power company.	1. Building of dams to produce electr 2. Building power transmission lines.

s	Continued and Additional Suggested Learning EXperiences
	1. Building of dams to produce electricity. (Con't from I.) 2. Building power transmission lines.

11.

ESEA Title III - 59-70-0135-2 Project I-C-5

CONCEPT 7. Factors such as facilitating transportation, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

Discipline Area Industrial A

Subject Electricity-

Problem Orientation Factors Production of New H

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPER	
Cognitive: The student will list 7 considerations and their involvement in hydroelectric dam building. Affective: The student will realize the complexity of involvements in developing hydroelectric power. Skills to be Learned 1. Production of hydroelectric power. 2. A project's impact on the environment 3. Planning of a project	I. Student-Centered in class activity A. Have selected students read book. (Manic 5) B. Panel discussion about the hydroelectric dam's environmental impact on the following areas. 1. Transportation 2. Natural Resources 3. Population growth 4. Leisure time use 5. Economic factors 6. Land use changes C. Field trip to local hydroelectric dam (Peshtigo River has 5) 1. Evaluate dam's environmental impact & relate to Manic 5 A. Changes in wildlife B. Changes in land use C. Changes in water quality	II. Out Com A. E H B. E p

ustrial Arts

ctricity-Electronics

Factors in The Grade 7-12
of New Hydroelectric Power

ING EXPERIENCES

II. Outside Resource and Community Activities
   A. Field trip to hydroelectric dam.
   B. Representative from power co.

Resource and Reference Materials	Continued and Additional Suggest
Publications: Manic 5 Modern General Shop, Goodheart-Wilcox Audio-Visual: #82045 The Dam Builders #50774 Dams #53537 Man Changes the Nile #05800 Water Power Univ. of Ill., Champaign, Ill. Community: 1. Representative from power co. 2. Fox River, 2 power dams near Kaukauna, 1 at Appleton, 3. Peshtigo River 4. Menominee River, Wolf River,	1. What other uses does a hydro besides producing power?

rials	Continued and Additional Suggested Learning Experiences
	1. What other uses does a hydroelectric dam have besides producing power?
ll.	
r co.	
eton,	
ver,	

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT

8. Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

Discipline Area Ind

Subject Ele

Problem Orientation To T

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNI
Cognitive: The student will research a specific thermal pollution alternative and write an opinion paper. Affective: The student will realize the factors related to thermal pollution from atomic energy production. Skills to be Learned 1. How electricity is produced by atomic energy. 2. What is thermal pollution & how do you handle it. 3. Brainstorming 4. Safety standards for Atomic energy generators.	I. Student-Centered in class activity A. After discussing the production of power using atomic energy, tackle the following problem: Since the water used in cooling an atomic reactor is considered thermal pollution what alternative are available? 1. It is not a problem 2. Use a cooling tower 3. Pipe it for residential heating 4. Put pipes in road for snow & ice removal 5. Various industrial uses 6. Fish pond culture/cooli 7. Brainstorm other uses B. Debate aforementioned clas developed list on pros & c C. What effect will warming L Mich. have on drinking wat quality of city water (eg. Green Bay), from blue-gree algae tastes?

. economic, social, and

ctors determine status

ues and attitudes

nvironment.

Discipline Area Industrial Arts

Subject Electricity-Electronics

Problem Orientation The Alternatives To Thermal Pollution Grade 7-12

BJECTIVES	SUGGESTED LEARNING EXPERIENCES	
student specific n alter- an opinion tudent factors al pollution gy production. rned ty is pro- ic energy. al pollution handle it. rds for generators.	I. Student-Centered in class activity A. After discussing the production of power using atomic energy, tackle the following problem: Since the water used in cooling an atomic reactor is considered thermal pollution what alternatives are available? 1. It is not a problem 2. Use a cooling tower 3. Pipe it for residential heating 4. Put pipes in road for snow & ice removal 5. Various industrial uses 6. Fish pond culture/cooling 7. Brainstorm other uses B. Debate aforementioned class developed list on pros & cons. C. What effect will warming Lake Mich. have on drinking water quality of city water (eg. Green Bay), from blue-green algae tastes?	II. Outside Resource and Community Activities 1. Rep. from AEC 2. Discover within the community other sources of thermal pollution. 3. Marine biologist/ limnologist 4. Fishery biologist, DNR 5. Site visitation, vistor center, Point Beach Nuclear Plant, Two Creeks, Wis. (highly recommended)

Resource and Reference Materials	Continued and Additional Suggested Le
Publications: Literature from AEC Address below.	1. With 2 aquariums set up with fish induce thermal pollution & obs Technical note: Temperatures above 8 become damaging to most warm water fi above 70-75 degrees become damaging t water fish such as trout & white fish
Audio-Visual: Power & Promise AEC Chicago Operations Office Office of Information 9800 S. Cass Ave. Argonne, Ill., 60439	
Community: 1. AEC - (Atomic Energy Commission) 2. Marine biologist -U.W. Green Bay 3. DNR Fishery division 4. Wisconsin Mich. Power Co. Appleton, Wis (co-operators of Point Beach Nuclear Reactor. 5. Wisconsin Public Service (operator of Carlton Nuclear Reactor)	

aterials	Continued and Additional Suggested Learning Experiences
	1. With 2 aquariums set up with fish & vegetation, induce thermal pollution & observe results. Technical note: Temperatures above 85-90 degrees become damaging to most warm water fish. Temperature above 70-75 degrees become damaging to most cold water fish such as trout & white fish.
ffice	
ommission . Green	
Co. rators ar	
ice Nuclear	

ESEA Title III - 59-70-0135-2 Project I-C-E

CONCEPT 10. Short-term economic gains may produce long-term environmental losses.

Discipline Area Indust

Subject Electr

Problem Orientation Pro

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
Cognitive: The student will list 3 areas in house wiring where meeting code minimums may prove insufficient over a period of time, & why. Affective: The student will realize the need for planning ahead in house wiring and using proper materials even though the cost may be higher. Skills to be Learned 1. Cost analysis sheets 2. Electrical codes	I. Student-Centered in class activity A. Presentation on local electrical building codes and requirements by building inspector or local electrician. B. Discuss why these codes should be met and even exceeded. 1. Added appliances in future. 2. Failure of minimum facilities C. Introduce and discuss flat-rate book for electrical work-new work vs. remodeling. (Minimal equipment & facilities will have to be replaced as time goes on & other appliances are added, etc.) 1. Install outlet-new-$15.00 2. Install Outlet-remodel work-$30.00 D. Brainstorm wastes brought about by necessity of re-wirin (Con't)

t-term economic gains

ce long-term environmental

Discipline Area Industrial Arts

Subject Electricity-Electronics

Problem Orientation Proper Home Wiring Grade 9-12

AL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
e student reas in where minimums ufficient of time,	I. Student-Centered in class activity A. Presentation on local electrical building codes and requirements by building inspector or local electrician. B. Discuss why these codes should be met and even exceeded. 1. Added appliances in future. 2. Failure of minimum facilities	II. Outside Resource Community Activities 1. Building inspector 2. Local electrician 3. Local contractor
e student the need ahead in and materials he cost .		
Learned sis sheets codes	C. Introduce and discuss flat-rate book for electrical work-new work vs. remodeling. (Minimal equipment & facilities will have to be replaced as time goes on & other appliances are added, etc.) 1. Install outlet-new-$15.00 2. Install Outlet-remodel work-$30.00 D. Brainstorm wastes brought about by necessity of re-wiring (Con't)	

Resource and Reference Materials	Continued and Additional Suggested Learn
Publications: 1. Contractors Flat-Rate Manual 2. National Electrical Code National Fire Protection Assoc. 3. Wisconsin Administrative Code Public Service Commission Audio-Visual: Community: 1. Local electrician 2. Local contractor 3. Building inspector	(Con't from I. D) 1. Natural resources in building materi must be dismantled. 2. Copper from wire which must be disca 3. Time needed to make necessary change 1. Set up model or mock-up of wall sect students actually install an outlet Now put in inside wall covering (ie. have students install outlet in fini Note difference in time & effort inv

s	Continued and Additicnal Suggested Learning Experiences
	(Con't from I. D)
	1. Natural resources in building materials of walls must be dismantled.
oc.	2. Copper from wire which must be discarded & replaced
e	3. Time needed to make necessary changes
	1. Set up model or mock-up of wall section & have students actually install an outlet (in bare framing) Now put in inside wall covering (ie. paneling) and have students install outlet in finished wall. Note difference in time & effort involved.

ESEA Title III - 59-70-0135-2 Project I-C+E

CONCEPT 11. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

Discipline Area In

Subject El

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARN
Cognitive: The student will be able to construct an electromagnet, and vary its carrying capacity. Affective: The student will realize that every individual act changes the system of which it is a part. Skills to be Learned How to make an electromagnet. How to increase the force of an electromagnet. How individual acts compound.	I. Student-Centered in class activity A. Students will study the methods of increasing the strength of an electromagnet. 1. Increase current 2. Increase turns of wire. 3. Increase size of core 4. Change core material B. Students will make an electromagnet and keep adding turns of wire until current flow is too low and system fails. C. Discuss how A.& B. relate to environmental problems. 1. Throwing paper on streets. 2. Too many taps on water line. 3. Overloading sewage plants 4. Overloading power supply.

ual acts, duplicated

d, produce significant

l alterations over time.

Discipline Area Industrial Arts

Subject Electricity-Electronics

Problem Orientation Magnetism Grade 7-12

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
tudent construct , and g capacity. tudent t every hanges ich it	I. Student-Centered in class activity A. Students will study the methods of increasing the strength of an electromagnet. 1. Increase current 2. Increase turns of wire. 3. Increase size of core 4. Change core material B. Students will make an electromagnet and keep adding turns of wire until current flow is too low and system fails. C. Discuss how A.& B. relate to environmental problems. 1. Throwing paper on streets. 2. Too many taps on water line. 3. Overloading sewage plants 4. Overloading power supply.	II. Outside Resource and Community Activities Rep. from telephone co. to speak on electro-magism.
rned lectro- the force net. cts compound.		

Resource and Reference Materials	Continued and Additional Suggeste
Publications: Modern General Shop, Walter C. Brown Goodhearth-Willcox Introduction To Electricity, and Electronics, Loper and AER Delmar Publisher Audio-Visual: Electromagnets: How They Work #01153 University of Ill., Champaign, Ill. Ferromagnetic Domain Unit Bell Telephone Co. Community: Rep. from telephone co.	

Materials	Continued and Additional Suggested Learning Experiences
ricity,	
ney ampaign, Unit	
o.	

ESEA Title III - 59-70-0135-2 Project I-C-F

CONCEPT

12. Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.

Discipline Area

Subject

Problem Orientati

BEHAVIORAL OBJECTIVES	SUGGESTED LEA
Cognitive: The student will show in writing the relationship of the FCC-OPER-BCI-TVI & give 3 specific examples. Affective: The student will become aware that transmitter operation carries responsibilities to others. Skills to be Learned 1. Transmitter design, tuning & operation. 2. FCC rules & regs. (rights of others) 3. Licensing procedures.	I. Student-Centered in class activity A. What effects are produced by an improperly tuned R.F. transmitter/ antenna 1. Inefficiency 2. Improper coupling 3. Chirping 4. R.F. shift 5. Over/under modulatio 6. Harmonics B. Why must BCI &TVI be cu 1. Rights of others 2 Pride of operation 3. FCC Rules & regulati (The FCC moniters to protect rights of other & to insure proper oper of the station) C. Discuss cause & effect between A & B. D. What can be done to cur BCI & TVI 1. Tune & design trans. equip. properly (dis various stages of tr

nership must be

tewardship and

oach upon or violate

right of others.

Discipline Area Industrial Arts

Subject Electricity-Electronics

Problem Orientation BCI & TVI & Rights of Others Grade 11-12

CTIVES	SUGGESTED LEARNING EXPERIENCES	
nt the ive ent at n ties	I. Student-Centered in class activity A. What effects are produced by an improperly tuned R.F. transmitter/ antenna 1. Inefficiency 2. Improper coupling 3. Chirping 4. R.F. shift 5. Over/under modulation 6. Harmonics B. Why must BCI &TVI be cured? 1. Rights of others 2 Pride of operation 3. FCC Rules & regulations (The FCC moniters to protect rights of others & to insure proper operation of the station) C. Discuss cause & effect between A & B. D. What can be done to cure BCI & TVI 1. Tune & design trans. equip. properly (discuss various stages of trans.)	II. Outside Resource and Community Activities 1. Local first class radio-TV engineer 2. Rep. from FCC (U.S. Courthouse, 219 S. Clark St., Chicago, Ill.) 3. Radio & TV repairmen
n, n.) es.		

Resource and Reference Materials	Continued and Additional Suggested Learni
Publications: Introduction to Electricity & Electronics, Loper & AHR Delmar Pub., Albany, N.Y. Radio Amateurs Handbook, American Radio Relay League Electronic Communication, Robert L. Shrader, McGraw-Hill Book Co. Audio-Visual: Community: 1. Radio-TV eng-1st class 2. Radio-TV repairman 3. FCC rep.	1. Establish & operate a "ham station" & students to earn "ham tickets"

rials	Continued and Additional Suggested Learning Experiences
&	1. Establish & operate a "ham station" & encourage students to earn "ham tickets"

PROJECT I-C-E Episode Evaluation Form (Reproduce o

Please fill in:
Subject: _____

Grade: _____

Concept No. Used: _____

In commenting on each episode us
form. Feel free to adapt it and a
your critiques and comments - nega
hand column, please rate (poor, go
make specific comments or suggesti
vided to help us make this a more

Poor	Good	Exc.	
			I. Behavioral Objectives A. Cognitive:
			B. Affective:
			II. Skills Developed
			III. Suggested Learning Experiences A. In Class:
			B. Outside & Community Activities:
			IV. Suggested Resource & Reference Materials (specific suggestions & comments)

CT I-C-E Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, please use this form. Feel free to adapt it and add more pages. Let us know all your critiques and comments - negative and positive. In the left-hand column, please rate (poor, good, excellent) each item. Also, make specific comments or suggestions if possible in the space provided to help us make this a more usable guide. Thank you.

I. Behavioral Objectives
A. Cognitive:

B. Affective:

I. Skills Developed

II. Suggested Learning Experiences
A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
(specific suggestions & comments)

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